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MBA PROFESSIONAL REPORT

Combating Principal-Agent Relationship Problems: Use of the Truth Revealing Incentive Mechanism

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By: **Daniel William Pupich,**
Victor Scott Lewis
December 2007

Advisors: **William R. Gates,**
E. Cory Yoder
Peter J. Coughlan

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13. ABSTRACT (maximum 200 words)

The purpose of this MBA professional report is to introduce the Truth Revealing Incentive Mechanism (TRIM) as a tool to help the government obtain more accurate cost estimates and control program costs. The TRIM is an economic mechanism based on principal-agent relationships that uses incentives to align contractors' interests with those of the Government. The TRIM combats principal-agent problems by extracting a contractor's true estimated costs. The TRIM is structured so that revealing the true estimated cost offers the contractor the highest potential fee.

This report describes the principal-agent theory, identifies principal-agent problems in the current DoD contracting environment, discusses how the TRIM addresses these problems more effectively than traditional cost-reimbursement contracts, and explains how and where the TRIM can be applied. This report also includes an electronic version of the TRIM in Microsoft Excel format, as well as a practitioner's guide to help contracting officers use the TRIM.

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COMBATING PRINCIPAL-AGENT RELATIONSHIP PROBLEMS: USE OF THE TRUTH REVEALING INCENTIVE MECHANISM

Daniel W. Pupich Sr., Captain, United States Air Force
Victor S. Lewis, Captain, United States Air Force

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December 2007

Authors: _____

Daniel W. Pupich Sr.

_____

Victor S. Lewis

Approved by: _____

William Gates, Advisor

_____

E. Cory Yoder, Advisor

_____

Peter J. Coughlan, Advisor

_____

Robert N. Beck, Dean
Graduate School of Business and Public Policy

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EXECUTIVE SUMMARY

The Government Accountability Office (GAO) has identified weapon system acquisition a high-risk area and finds the persistent and long-standing nature of acquisition problems has perhaps made a range of key players both in the Pentagon and the Congress complacent about cost growth, schedule delays, quantity reductions, and performance shortfalls in weapon system programs.[1] The government's inability to effectively estimate and control a procurement program's cost must be resolved. The authors contend that principal-agent problems are a driver behind program cost over-runs.

The purpose of this MBA professional report is to introduce the Truth Revealing Incentive Mechanism (TRIM) as a tool to help the government obtain more accurate cost estimates and control program costs. The TRIM is an economic mechanism based on principal-agent relationships that uses incentives to align contractors' interests with those of the Government. The TRIM combats principal-agent problems by extracting a contractor's true estimated costs. The TRIM is structured so that revealing the true estimated cost offers the contractor the highest potential fee.

Principal-agent problems such as: artificially inflating target costs when market forces are absent, buying-in to win a contract award, and intentionally using sub-standard workers, the "B-Team," to execute contracts are strategic behaviors that contractors can employ to further their objectives at the Government's expense. These problems contribute to the cost over-runs that plague so many DoD procurements. The authors of this research paper found value in an economic concept (Gates mechanism) that addressed these types of principal agent problems. The mechanism, although useful in theory, did not fit into the boundaries of the DoD contracting environment. The authors endeavored to create a bridge from theory to application by creating the TRIM. This research paper illustrates that journey.

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[1] U.S. General Accountability Office. (2006). *Defense Acquisitions: DOD Wastes Billions of Dollars through Poorly Structured Incentives.* (GAO-06-409T). Washington D.C.

This paper describes the principal-agent theory, identifies principal-agent problems in the current contracting environment, discusses how the TRIM addresses these problems more effectively than traditional cost-reimbursement contracts, and explains how and where the TRIM can be applied. This report also includes an electronic version of the TRIM in Microsoft Excel format, as well as a practitioner's guide to help contracting officers use the TRIM.

I.   INTRODUCTION

In Department of Defense (DoD) acquisitions, the Government's objectives are to procure capabilities better, faster, and cheaper. Defense contractors' objectives are to maximize profit while fulfilling the Government's objectives. Consequently, the DoD often enters into contracts with a misalignment of objectives that result in increased costs. Contractors have opportunities to engage in strategic behavior for the purpose of furthering their own interests at the expense of the Government, thus problems may arise. Wouldn't it be nice if the DoD had a contracting tool that aligns contractor and Government objectives and reveals a contractor's true cost before entering into a contract? Better yet, wouldn't it be great if the contractor voluntarily shared this true cost information with the Government?

This MBA professional report introduces the Truth Revealing Incentive Mechanism (TRIM) and explains how the TRIM can be used to control program costs by revealing: contractor's true cost and program budget shortfalls.

The cost reimbursement contract environment allows contractors to easily further their interests (profit) at the Government's expense by misrepresenting their true costs. For example, a contractor may propose a target cost lower than their true cost to increase the probability of winning the contract, a practice known as "buying-in." Another example of strategic behavior is when a contractor, in the absence of competition or market forces, proposes a target cost much higher than their true cost to receive a higher target fee.

One key to program success lies in the ability to reveal a contractor's true cost and align DoD and contractor objectives. How do we align both DoD and contractor objectives and make sure that contractors reveal their true-costs? We recognize two approaches—external and internal controls. The typical DoD approach focuses on external controls exemplified in the form of rules, regulations and additional oversight. Unfortunately, external controls are usually very costly, resource intensive, and often ineffective. In contrast, internal controls are a more cost effective way to ensure

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contractors act in the Government's best interest. Internal controls are contract incentives such as share ratios, award fees, and award terms that reward contractors for working towards Government objectives.

Kenneth Oscar, former Assistant Secretary of the Army for Acquisition, Logistics, and Technology [ASA][ALT], wisely stated "Our [the Government's] goal is to get the best product or service for the price, the contractor's goal is to give us the best product or service while reducing risk and increasing profit. The key to a good contract is to structure it in such a way to align our goals with the contractor's goals.[2] The TRIM is an economic mechanism based on principal-agent relationships that uses incentives to align contractors' interests with those of the Government. The mechanism is named "truth revealing" because it incentivizes the contractor to pick the contract that most closely reflects their expected cost. In other words, the incentive structure should ensure that the contractor maximizes expected profits by choosing a low cost target if expected costs are low, and by choosing a high cost target if expected costs are high.[3]   With most major acquisition programs reporting cost over-runs, the DoD could benefit from using the TRIM to extract true expected cost information from contractors. Knowing a contractor's true expected cost helps the Government identify budget concerns.

The second chapter explains the economic concept of principal-agent relationships and the resulting problems encountered, such as asymmetric information, moral hazard, and adverse selection. This section gives the reader a background understanding of the economic principles and theories used in deriving the TRIM.

The third chapter explains how principal-agent problems enable contractors to engage in strategic behavior to further their own personal objectives at the expense of the Government. There are many situational factors surrounding DoD's contracting environment, especially in cost reimbursement contracts, that make principal-agent problems very attractive to contractors (i.e. easy for the contractor to act in their own best

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[2] RAND Arroyo Center, RAND Corporation. (2005). *Reexamining Military Acquisition reform: Are we there yet?* Retrieved September 20, 2007, from http://www.rand.org/pubs/monographs/2005/RAND_MG291.pdf.

[3] W. R. Gates. (1987). *Incentive Contracting and the Design of Regulatory Mechanisms: Theory is Nice but Can it be Applied? (Economic Research Series No.29). Pasadena: Jet Propulsion Laboratory.*

interest, at the expense of the Government, while maintaining the veneer that they are acting in the Government's best interest). This chapter will investigate areas in the current DoD cost reimbursement contracting environment that are highly susceptible to principal-agent relationship problems.

The fourth chapter introduces the TRIM, explains how the mechanism works, and how the TRIM rectifies DoD-specific principal-agent problems discussed in the previous chapter. This chapter also highlights benefits of the TRIM that extend beyond principal-agent concepts.

The fifth chapter explains where the TRIM can be best applied to the DoD contract environment. This chapter will explain how the original mechanism was modified to fit within the constraints of the Federal Acquisition Regulations and lessons learned about the mechanism's behavior from repeated simulations. This chapter will also cover limitations of the mechanism found while testing the mechanism.

The sixth, and final, chapter of this professional report will discuss areas for further research.

Included as an appendix to the professional report is a practitioner's guide providing contracting officers step-by-step instructions on how to set-up and execute the TRIM in preparation for contract negotiations and subsequent contract administration.

This report gives readers the knowledge needed to implement the TRIM, but before contract professionals can use the TRIM to combat principal-agent problems, they must first understand the problems associated with principal-agent relationships. The next chapter introduces the reader to principal-agent relationships.

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II.   PRINCIPAL AGENT RELATIONSHIPS

A.   CHAPTER OVERVIEW

The TRIM mechanism is based on an economic field of study called agency theory, also known as principal-agent relationships. This chapter gives a general history of the theory, defines major concepts, and gives examples of each concept.

B.   PRINCIPAL-AGENT HISTORY

The study of principal-agent relationships started in the late 1960s when economists explored how cooperating parties dealt with their different attitudes towards risks. The theory expanded to included principal-agent problems that occur when cooperating parties have different goals.[4] The principal-agent relationship framework is used to define problems in many areas of study such as: economics, finance, corporate governance, insurance, politics, strategy, and organizational behavior.

C.   PRINCIPAL-AGENT THEORY

A principal-agent relationship is formed when one party is delegated work to perform for the benefit of the other party. Principal-agent theory is derived from the trade-off between (a) the cost of measuring behavior and (b) the cost of measuring outcomes and transferring risk to the agent.[5]

1.   Principal

The principal is an individual or organization that employs another individual or organization to work on its behalf to achieve an objective(s). For example, if a homeowner hires a landscaper to cut his lawn, the homeowner is the principal.

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[4] K. M. Eisenhardt. (1989). Agency Theory: An Assessment and Review. *Academy of Management Review*, 14, 57-74. Retrieved October 10,2007 from EBSCOhost database.

[5] Eisenhardt, 58.

2. Agent

The agent is an individual or organization that acts on the principal's behalf and is supposed to advance the principal's interests.[6] For example, if a homeowner hires a landscaper to cut his lawn, the landscaper is the agent.

D. PRINCIPAL-AGENT RELATIONSHIP PROBLEMS

Motivating one person or organization to act on behalf of another is known among economists as the "principal-agent problem".[7] The principal employs the agent to work towards the principal's best interest. Conversely, there is a tendency for an agent to work towards their own best interest. Problems arise when the principal and agent's interests are misaligned. BIth parties often have incomplete information and it is usually costly or difficult for the principal to perfectly monitor whether or not the agent is acting in the principal's interest. As a result, agents can engage in strategic behaviors that further their own best interests at the expense of the principal's best interests.[8]

Principal-agent problems and issues discussed in this chapter are information asymmetry, moral hazard, adverse selection, signaling, and risk aversion.

1. Information Asymmetry

Information asymmetry occurs in principal-agent relationships when relevant information (perhaps about incentives, effort, or plans) is known and privately held by only the agent.[9] This private information gives advantage to the agent in principal-agent negotiations and affords the agent pre-contractual opportunism. For example, a landlord living in a state different from that of his rental property contracts with a lawn service to keep the grounds looking nice. The amount of effort and cost of the effort performed by

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[6] P. Milgrom, & J. Roberts. (1992). *Economics, Organization & Management.* New Jersey: Prentice Hall.

[7] Milgrom, 214.

[8] Gates, 2.

[9] Milgrom, 140.

the lawn service is unknown and unobservable by the principal. The landlord only knows he pays the invoice for the service performed.

2. Moral Hazard

Moral hazard is post-contract opportunism allowing the agent to use information asymmetry to take hidden actions that furthers the agent's best interest at the expense of the principal. Moral hazard arises when the principal is unable to simply force the agent to act according to his interests.[10] For example, a contractor has two ongoing cost-reimbursement contracts. One contract rewards cost control with additional fee and the other provides a fixed fee with no incentive for cost control. The contractor can put its stronger engineers against the cost-control contract and its weaker engineers against the fixed-fee contract, so that the contract structure encourages the contractor to take actions that are in the agent's but not the principal's best interest.

3. Adverse Selection

Adverse selection occurs when the selection process has the unintended consequence of encouraging outcomes that the principal considers unfavorable.[11] Adverse selection originates from the inability of the principal to verify information provided by the agent and becomes evident post contract award. For example, employees at a business may choose from two options given through their healthcare plan, one option is a low-cost standard benefit plan; the other is a high-cost comprehensive benefit plan. Adverse selection occurs because the sickest employees will choose the high-cost comprehensive benefit plan, thus increasing the plan's overall costs.

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[10] Gates, 2.

[11] Gates, 3.

4.   Signaling

Signaling occurs when a principal uses an agent's observable behaviors to uncover an agent's private information. For example, during a job interview, the agent includes scholastic achievements in their resume signaling to their prospective employer their intelligence and diligence.

5.   Risk Aversion

Risk aversion occurs when individuals would rather have a smaller income that is certain as opposed to an uncertain income that is larger on average but is subject to unpredictable and uncontrollable variability.[12]   For example, a risk-averse employee might prefer to be guaranteed $60 for their effort rather than take the chance of earning an uncertain income with an average of $75, where there was the possibility of earning $100 for optimum performance and $50 for poor performance.

Now that the foundation has been laid by explaining principal-agent relationships and concepts, Chapter III will describe where principal-agent problems are found in the DoD contracting environment.

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[12] Milgrom, 187.

III. PRINCIPAL-AGENT PROBLEMS IN THE DOD CONTRACTING ENVIRONMENT

Principal-agent problems exist in most contractual relationships due to differing objectives held by the principal and agent. This chapter identifies principal-agent problems in DoD's contracting environment and explains how these problems enable contractors to engage in strategic behavior to further their objectives at the Government's expense.

There are many situational factors surrounding DoD's contracting environment, both with and without competitive market forces, which make principal-agent problems exploitable for contractors to the detriment of the Government. Because principal-agent relationship problems are most easily exploited when using cost reimbursement contracts, this paper focuses on problems with respect to cost reimbursement contracts. To understand how principal-agent problems occur in cost reimbursement contracts, it is important to understand the fundamentals of such contracts.

A. COST REIMBURSEMENT CONTRACTS

The Government uses cost reimbursement contracts when there is a high level of uncertainty and the contractor is unwilling to assume risk under a fixed price contract. In a cost reimbursement contract, the Government accepts the cost and performance risk by reimbursing the contractor for all allowable costs incurred in performing the contract. The contractor signs up to give their "best effort" in achieving contract requirements within the maximum contract price. A best effort can equate to exhausting all contract funds, yet falling short of meeting contract requirements.

B. INFORMATION ASYMMETRY

Information asymmetry is differences among individuals in their information[13] or, in the context of contracting, one party having information not known to the other. A

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[13] Milgrom, 600.

party's decision to truthfully reveal this information is solely optional. This asymmetry provides the party holding private information leverage in dealings with the other party and affords opportunities to further their objectives.

Information asymmetry in Government contracting usually means the agent (contractor) has privately held information on company costs that the principal (Government) cannot obtain. Contractors have incentives to keep this information private to maintain leverage in negotiations with the principal as well as affording opportunities to buy-in and win contracts, unbeknownst to the Government.

1. Disadvantaged Negotiating Position

The fact there is asymmetrical information places the Government in a disadvantaged position for negotiations. The Government determines "should" costs for a program. Should costs are a reasonable estimate of how much the procurement will cost. Should cost is determined by gathering internal and independent estimates of cost and historical information on procurements similar in size and complexity. Similarly, the contractor estimates "should" costs, but also possesses the ability to more accurately estimate "could" costs. Could cost is a contractor's best estimation of cost considering available resources, their efficiency, and their application to the procurement. A contractor's "could cost" can be either higher or lower than the Government's should cost. Only the contractor knows if the cost proposed is efficient given their resources. The current Government practice to counter this asymmetric information position relies on Government subject matter experts to evaluate the contractor's proposed tasks for reasonableness, both in effort and cost. While the Government evaluates reasonableness, without knowing the contractor's information, the Government is unable to evaluate whether the cost is efficient given the resources. The contractor's proposed cost and the contractor's actual cost can be two very different figures, varying either positively or negatively.

2. Buying-in

Buying-in occurs for many reasons. One of which is the contractor heavily desires to win the contract. The Government awards contracts based on the best value or lowest price technically acceptable to the Government. Both approaches use price as a heavily weighted factor in evaluating to whom the contract will be awarded. This entices a contractor to propose a price lower than their known cost/cost information suggests.

Buying in may occur because the contractor knows the work to be performed is more costly than the figure they propose but are forced to buy-in due to the restriction of the Government's budget. The contract will not be awarded unless the cost is within the Government's budget. The Government's budget constraint forces all contractors to propose a cost they know will be exceeded.

Contractors can propose a price lower than their true cost with the intent of increasing their chances of winning a contract, with the hope of later recouping these costs through contract modifications/renegotiation or follow-on work. How does the Government know this is happening? It is not totally evident to the Government the contractor is attempting to buy-in and many times the result can be cost overruns and program volatility.

Other reasons buying-in occurs may be the desire to prevent award to competitors, entering a desirable market to gain experience, keeping their workforce intact, or "getting their foot in the door" by winning this award and hoping it will lead to similar follow-on type work. Without the knowledge of contractor buy-in, the Government is surely to overrun their budget.

The imbalance of information results because the contractor is privy to their own company cost structure and resources and better estimates costs than the Government. True cost, and if the contractor bought-in, will only be known when the project is complete and all allowable, incurred contractor costs including any fee have been paid.

3. Sole Source Environment

Occasionally the Government has a requirement that can only be met by a sole source and this gives the source leverage over the Government. Adding to this leverage is the fact that contractors can easily find Government program financial information. The Government's mandated process of financial transparency provides the public, and thus the contractor, information concerning the Government's congressionally appropriated program costs (budget).

The agent, armed with budget information, has no incentive to propose a price lower than the budget even if their estimated true cost is below the Government's budget. The contractor is incentivized to propose a price equal to the budget. The contractor can include inefficiencies in their proposal, such as allowing for less efficient workers in their proposal and having more efficient workers actually perform the work.

C. MORAL HAZARD

Moral hazard was defined previously as post-contract opportunism allowing the agent to use information asymmetry to take hidden actions that further the agent's objectives at the principal's expense.

The Government's approach to the problem of moral hazard, and countering any hidden action, is one of buying adherence to Government interests through oversight and insight. To align interests and prevent moral hazard, the Government buys a level of insight into contractor performance using financial and program reports and oversight by program office managers assigned responsibility for the requirement. This approach is costly and relatively ineffective because it only provides the Government a retrospective view of costs incurred.

An incentive contract with appropriately outlined incentives may help control moral hazard. Incentive contracts align interests through rewarding the contractor when faced with a choice to choose in the interest of the Government. However, when

conditions warrant use of a cost-plus-award-fee (CPAF) contract, there may be greater contractor focus on satisfying the Government's subjective award fee criteria than aligning interests.

Post-contract opportunism has been easily exploited when using CPAF contracts. CPAF contracts are chosen when objective incentive targets are not easily defined; therefore, a subjective evaluation of predetermined criteria is used to motivate the contractor. The purpose for using CPAF contracts has been lost as the DoD has paid high award fees regardless of contractor performance.

A recent Government Accountability Office report stated:

> DoD practices—such as routinely paying its contractors nearly all of the available award fee, amounting to billions of dollars, regardless of whether the acquisition outcomes fell short of, met, or exceeded expectations; rolling an estimated $669 million in unearned or withheld award fees to future evaluation periods; and paying a significant portion of the available fee for what award-fee plans describe as "acceptable, average, expected, good, or satisfactory" performance—all lessen the motivation for the contractor to strive for excellent performance.[14]

The trend of paying consistently high award fees can be alternatively seen as a cost reimbursement contract paying a fixed fee. Cost-plus-fixed-fee (CPFF) contracts pay a negotiated fixed amount without regard to program costs. Similarly, there is no incentive to control costs in a CPAF contract if the contractor receives approximately the same fee regardless of performance. Figure 1 shows a sample of programs grossly over budget and their respective award-fee payouts. Figure 2 shows the consistency with which these high levels have been paid.

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[14] U.S. General Accountability Office. (2007). *Defense Acquisitions: DOD Has Paid Billions In Award and Incentive Fees Regardless of Acquisition Outcomes.* (GAO-06-66). Washington D.C.

Table 2: Program Performance and Award-Fee Payments on Selected DOD Development Programs

Acquisition outcomes	Comanche reconnaissance attack helicopter	F/A-22 Raptor tactical fighter aircraft	Joint Strike Fighter tactical fighter aircraft	Space-Based Infrared System High
Research and development cost increase over original baseline	$3.7 billion 41.2 percent	$10.2 billion 47.3 percent	$10.1 billion 30.1 percent	$3.7 billion 99.5 percent
Acquisition cycle time increase over original baseline	33 months 14.8 percent	27 months 13.3 percent	11 months 5.9 percent	More than 12 months[a]
Number of program rebaselines	1[b]	14	1	3
Total award fee paid to prime systems contractor	$202.5 million paid through 2004	$848.7 million	$494.0 million	$160.4 million[c]
Percentage of award fee paid to prime systems contractor (adjusted for rollover)[d]	85 percent of available fee	91 percent	100 percent	74 percent
Total award fee paid to prime engine contractor	No engine contractor	$115 million paid through 2004	$35.8 million	No engine contractor
Percentage of award fee paid to prime engine contractor (adjusted for rollover)[d]	N/A	89 percent of the available fee	100 percent	N/A

Sources: DOD submissions to GAO, contract documentation, and GAO-05-301 (data); GAO (analysis and presentation).

Source: From GAO Report (06-066)

Figure 1.   Program Performance and Award-fee Payments on Selected DoD Development Programs

Source: From GAO Report (06-066)

Figure 2.   Percentage of Available Award Fee Earned for 572 Evaluation Periods in GAO's Sample.

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D. ADVERSE SELECTION

Adverse selection originates from the principal's inability to verify the information provided by the agent. Because the Government does not have information regarding all of a contractor's resources, verifying information is impossible. The true problem with adverse selection is that adverse selection occurs pre-contract award but becomes evident post-contract award. Often, the Government can not prevent adverse selection from occurring nor does a tool exist that signals when it may occur. The inability to avoid contracting with a less efficient firm increases cost.

The Government does their best to reduce principal-agent problems such as information asymmetry, moral hazard, and adverse selection. The TRIM mechanism was specifically designed to address principal-agent problems. Although the TRIM does not completely eliminate principal-agent problems, it can provide protection against these problems where the traditional contract mechanisms fall short. The next chapter introduces the TRIM, compares it to traditional cost-reimbursement contracts, and explains how the TRIM reduces principal-agent problems better than traditional contracts.

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IV.   USING THE TRIM TO COMBAT PRINCIPAL-AGENT PROBLEMS

A.   WHAT IS THE TRIM?

The TRIM is an economic mechanism based on principal-agent relationships that uses monetary incentives to align a contractor's interests with those of the Government. The TRIM was derived from a negotiation mechanism described in a research paper by NPS Associate Professor William Gates titled "Incentive Contracting and the Design of Regulatory Mechanisms: Theory is nice but can it be applied?"[15]   The negotiation mechanism was developed for the Jet Propulsion Laboratory's use when negotiating the purchase of satellite subsystems from NASA contractors on a cost reimbursement basis. Gates' negotiation mechanism was further modified to include Federal Acquisition Regulations (FAR) policy guidelines, leading to the mechanism that this report names "TRIM."

B.   STRUCTURE OF THE TRIM

The mechanism is called "truth revealing" because it structures incentives in such a way that contractors are incentivized to select the contract option that most closely reflects their expected cost. In other words, the incentive structure ensures the contractor maximizes expected fees by choosing a low cost target if expected costs are low, and by choosing a high cost target if expected costs are high.

Simply put, the TRIM generates a variety of contract options from which a contractor can choose. The options provided by the TRIM read like a restaurant menu. Each option on the menu has three components listed in the columns: target cost, share ratio, and target fee. Each row on the menu is a contract option available to the contractor. Each row is a packaged deal—the contractor can not select a target cost from

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15 Gates, 6.

one row and a share ratio or target fee from another. Figure 3 is an example of a contract menu established by TRIM. The highlighted row signifies one of the many options available.

Contract Menu		
Target Cost	Share Ratio	Target Fee
$ 4,050,000	0.600	$ 759,375
$ 4,114,286	0.568	$ 721,837
$ 4,178,571	0.536	$ 686,365
$ 4,242,857	0.504	$ 652,959
$ 4,307,143	0.471	$ 621,620
$ 4,371,429	0.439	$ 592,347
$ 4,435,714	0.407	$ 565,140
$ 4,500,000	0.375	$ 540,000
$ 4,564,286	0.343	$ 516,926
$ 4,628,571	0.311	$ 495,918
$ 4,692,857	0.279	$ 476,977
$ 4,757,143	0.246	$ 460,102
$ 4,821,429	0.214	$ 445,293
$ 4,885,714	0.182	$ 432,551
$ 4,950,000	0.150	$ 421,875

Figure 3.   TRIM-based Contract Menu

C.   HOW DOES TRIM WORK?

Incentives are structured so the contractor has the potential to earn the highest fee if they choose the contract closest to their expected costs. The target fee function is structured so contractors have the potential to receive higher fee if they choose a lower target cost. The share ratio is structured so that a contractor's risk increases as the target fee increases (target cost decreases).

The mathematical relationship between the target fees, target costs, and share ratio make the fee lost by over-running the target cost greater than the fee gained by selecting a lower target cost. Reciprocally, the fee gained by under-running the target cost is less than the potential fee gained by selecting a lower target cost. The relationship between target cost, share ratio, and target fee make the TRIM truth revealing.

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The chosen target fee is divided into two pools: incentive and award fee. The incentive fee uses an objective formula based on how well the contractor's target cost equates to actual costs. The award fee is a subjective incentive the contractor may earn in entirety or in part during contract performance. The award fee portion is intended to incentivize the contractor in performance areas outside of cost, such as: quality, schedule, and technical performance.

In order for the TRIM to create truth revealing incentives, the incentive and award fee pools must be interconnected. When using the TRIM, contracts are structured so any cost over-run is first deducted from the incentive fee portion of the target fee. If the cost over-run is so large that it eliminates the entire cost incentive fee, the overrun penalty is taken from the award fee pool. Simply put, the contractor's share of a cost over-run can reduce both the cost incentive pool and award fee pool.

The details of how to construct the TRIM contract menu, negotiate using the TRIM, and administer the contract using the TRIM are explained in the user's guide provided as an appendix to this report.

D.   HOW TRIM REDUCES PRINCIPAL-AGENT PROBLEMS

The TRIM was specifically designed to address principal-agent problems the Government was vulnerable to under traditional cost-reimbursement contract mechanisms. In this section, a TRIM-based contract is compared against traditional cost-reimbursement contracts to explain how a TRIM-based contract reduces principal agent problems. The TRIM-based contract is compared against three of the most common cost-reimbursement contracts: CPFF, CPAF, and cost-plus-incentive-fee (CPIF). Below, traditional cost reimbursement contracts are defined.

1. Traditional Cost Reimbursement Contracts

Cost-Plus-Fixed-Fee (CPFF): a cost-reimbursement contract that provides for payment to the contractor of a negotiated fee that is fixed at the inception of the contract. The fixed fee does not vary with actual cost."[16]

Cost-Plus-Award-Fee (CPAF): a cost-reimbursement contract that provides for a fee consisting of (a) a base amount (which may be zero) fixed at inception of the contract and (b) an award amount, based upon a judgmental evaluation by the Government, sufficient to provide motivation for excellence in contract performance."[17]

Cost-Plus-Incentive-Fee (CPIF): a cost-reimbursement contract that provides for an initially negotiated fee to be adjusted later by a formula based on the relationship of total allowable costs to total target costs."[18]

2. Combating the Incentive to Raise Target Costs

In CPFF, CPAF, and CPIF contracts, the target fee is customarily based on a percentage of target cost. It is in the contractor's best interest to negotiate a target cost as high as possible because increasing the target cost equates to an increase in potential fees. Information asymmetry places the Government in a disadvantaged negotiating position when trying to uncover these strategic cost increases. Since the Government does not have access to a contractor's private information, it is hard for the Government to determine if a contractor's proposed cost is legitimate. The typical DoD approach to uncover private information has focused on external measures represented in the form of purchasing contractor cost information and using Government subject experts to thoroughly evaluate proposals for excessive costs. Unfortunately, external controls are usually costly and resource intensive. The alternative approach, internal controls, involves using contract incentives to encourage the contractor to act in the DoD's interest by rewarding the contractor with higher profits for revealing true costs. The following

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[16] Federal Acquisition Regulations (FAR). Current through FAC 2005-21, November 2007.

[17] Federal Acquisition Regulations.

[18] Federal Acquisition Regulations.

example explains how traditional contract mechanisms encourage contractors to inflate costs during negotiations, while the TRIM incentivizes contractors to lower their target costs, if their expected costs are lower.

For example, the Air Force is negotiating with a traditional contract vehicle (CPFF, CPAF, or CPIF) to build state-of-the-art video sensors for the Predator Unmanned Arial Vehicle (UAV). The contractor estimates the development work will cost $12M and believes they will negotiate a reasonable target fee of 10%. Figure 4, shows how contractors are incentivized to propose higher target costs when negotiating a traditional cost-reimbursement contract. Column A represents the possible target costs the contractor can propose to the Government for developing the sensors. Column B represents the target fee the contractors would receive if the fee is based on a negotiated percentage of target cost (10%). Column C represents the total contract price and is the sum of column A and B. The green highlighted row represents the contractor's estimated true costs. As the diagram indicates, a traditional cost reimbursement contract incentivizes a contractor to propose a target cost higher than their estimated cost.

A	B	C	
Target Cost	Target Fee (10% of Target Cost)	Cost Total	
$ 10,800,000	$ 1,080,000	$ 11,880,000	
$ 10,971,429	$ 1,097,143	$ 12,068,571	
$ 11,142,857	$ 1,114,286	$ 12,257,143	
$ 11,314,286	$ 1,131,429	$ 12,445,714	
$ 11,485,714	$ 1,148,571	$ 12,634,286	
$ 11,657,143	$ 1,165,714	$ 12,822,857	
$ 11,828,571	$ 1,182,857	$ 13,011,429	
$ 12,000,000	$ 1,200,000	$ 13,200,000	* Expected Costs
$ 12,171,429	$ 1,217,143	$ 13,388,571	
$ 12,342,857	$ 1,234,286	$ 13,577,143	
$ 12,514,286	$ 1,251,429	$ 13,765,714	
$ 12,685,714	$ 1,268,571	$ 13,954,286	
$ 12,857,143	$ 1,285,714	$ 14,142,857	
$ 13,028,571	$ 1,302,857	$ 14,331,429	
$ 13,200,000	$ 1,320,000	$ 14,520,000	

Target Fee Increases as Target Cost Increases

Figure 4.   Cost-Reimbursement Opportunism for Contractors (Raising Target Costs)

A contract negotiated using the TRIM is not vulnerable to the same pre-contractual opportunism. When using the TRIM, target costs and target profits are inversely related so a contractor is not incentivized to overstate their proposed target costs.

For example, the Air Force is using the TRIM in negotiating with a sole-source to build state-of-the-art video sensors for the Predator Unmanned Arial Vehicle. The contractor estimates the development work will cost $12M and believes they will negotiate a reasonable fee of 10%. Due to the TRIM incentive structure, the contractor has no incentive to inflate cost. Figure 5, shows how a TRIM-based contract defends against contract opportunism.

Target Fee Increases as Target Costs Decrease

A	B	C		D	
Target Cost	Share Ratio	Target Fee		Cost Total	
$ 10,800,000	0.400	$ 1,620,000		$ 12,420,000	
$ 10,971,429	0.386	$ 1,552,653		$ 12,524,082	
$ 11,142,857	0.371	$ 1,487,755		$ 12,630,612	
$ 11,314,286	0.357	$ 1,425,306		$ 12,739,592	
$ 11,485,714	0.343	$ 1,365,306		$ 12,851,020	
$ 11,657,143	0.329	$ 1,307,755		$ 12,964,898	
$ 11,828,571	0.314	$ 1,252,653		$ 13,081,224	
$ 12,000,000	**0.300**	**$ 1,200,000**		**$ 13,200,000**	* Expected Costs
$ 12,171,429	0.286	$ 1,149,796		$ 13,321,224	
$ 12,342,857	0.271	$ 1,102,041		$ 13,444,898	
$ 12,514,286	0.257	$ 1,056,735		$ 13,571,020	
$ 12,685,714	0.243	$ 1,013,878		$ 13,699,592	
$ 12,857,143	0.229	$ 973,469		$ 13,830,612	
$ 13,028,571	0.214	$ 935,510		$ 13,964,082	
$ 13,200,000	0.200	$ 900,000		$ 14,100,000	

Figure 5.   TRIM-Based Contract that Defends Against Contractor Opportunism (Raising Target Costs)

Column A represents the possible target costs the contractor can select for developing the sensors. Column B represents the contractor share ratio. Column C represents the potential target fee a contractor can earn, based on the target cost in the same row. Column D represents the total contract price and is the sum of column A and

C. The green highlighted row represents the contractor's estimated true cost. As the diagram indicates, the TRIM-based contract does not incentivize the contractor to propose a target cost higher than their estimated cost. The figure even seems to suggest that the TRIM-based contract incentivizes contractors to propose a target cost lower than their expected cost. However, the share ratio keeps the contractor from proposing a target cost lower than their expected cost. The share ratio and target fee increase proportionately so that a contractor assumes more risk if they attempt to earn a larger profit pool. Figure 6 is a payout table that shows how the TRIM incentivizes a contractor to propose a target cost that is the same as their expected contract cost. Payout tables of traditional cost reimbursement contracts are illustrated later in this chapter.

Figure 6. TRIM Fee-Payout Table

	A	B	C	D	E	F	G	H	I	J	K	L	M	
							Actual Cost							
	Target Cost	$11,142,857	$11,314,286	$11,485,714	$11,657,143	$11,828,571	$12,000,000	$12,171,429	$12,342,857	$12,514,286	$12,685,714	$12,857,143	$13,028,571	Incentive
1	$11,142,857	$1,487,755	$1,424,082	$1,360,408	$1,296,735	$1,233,061	$1,169,388	$1,105,714	$1,042,041	$978,367	$914,694	$851,020	$787,347	to
2	$11,314,286	$1,486,531	$1,425,306	$1,364,082	$1,302,857	$1,241,633	$1,180,408	$1,119,184	$1,057,959	$996,735	$935,510	$874,286	$813,061	Minimize
3	$11,485,714	$1,482,857	$1,424,082	$1,365,306	$1,306,531	$1,247,755	$1,188,980	$1,130,204	$1,071,429	$1,012,653	$953,878	$895,102	$836,327	Target
4	$11,657,143	$1,476,735	$1,420,408	$1,364,082	$1,307,755	$1,251,429	$1,195,102	$1,138,776	$1,082,449	$1,026,122	$969,796	$913,469	$857,143	Cost
5	$11,828,571	$1,468,163	$1,414,286	$1,360,408	$1,306,531	$1,252,653	$1,198,776	$1,144,898	$1,091,020	$1,037,143	$983,265	$929,388	$875,510	
6	$12,000,000	$1,457,143	$1,405,714	$1,354,286	$1,302,857	$1,251,429	$1,200,000	$1,148,571	$1,097,143	$1,045,714	$994,286	$942,857	$891,429	
7	$12,171,429	$1,443,673	$1,394,694	$1,345,714	$1,296,735	$1,247,755	$1,198,776	$1,149,796	$1,100,816	$1,051,837	$1,002,857	$953,878	$904,898	
8	$12,342,857	$1,427,755	$1,381,224	$1,334,694	$1,288,163	$1,241,633	$1,195,102	$1,148,571	$1,102,041	$1,055,510	$1,008,980	$962,449	$915,918	
9	$12,514,286	$1,409,388	$1,365,306	$1,321,224	$1,277,143	$1,233,061	$1,188,980	$1,144,898	$1,100,816	$1,056,735	$1,012,653	$968,571	$924,490	
10	$12,685,714	$1,388,571	$1,346,939	$1,305,306	$1,263,673	$1,222,041	$1,180,408	$1,138,776	$1,097,143	$1,055,510	$1,013,878	$972,245	$930,612	
11	$12,857,143	$1,365,306	$1,326,122	$1,286,939	$1,247,755	$1,208,571	$1,169,388	$1,130,204	$1,091,020	$1,051,837	$1,012,653	$973,469	$934,286	
12	$13,028,571	$1,339,592	$1,302,857	$1,266,122	$1,229,388	$1,192,653	$1,155,918	$1,119,184	$1,082,449	$1,045,714	$1,008,980	$972,245	$935,510	

Incentive to Lower Actual Costs

Figure 6.   TRIM Fee-Payout Table

In Figure 6, the letters (A-M) represent the columns and the numbers (1-12) represent the rows. The letters and numbers will be used to identify specific cells in explaining this figure. The blue colored column (column A) represents possible target costs a contractor can choose. The green colored row (top row) represents the actual cost of the contract. The yellow and orange cells represent potential fees. The orange shaded cells represent the highest potential fee a contractor can receive for a given actual cost. As shown in the figure above, if a contractor expects actual costs to be $12M (Column G), the highest fee a contractor can earn is if the contractor chooses a target cost of $12M (Cell G6). There is no incentive for the contractor to propose any target cost other than what the contractor believes to be their true cost. Yet, there is still an incentive for the contractor to perform as efficiently as possible and reduce actual costs (fees increase as you move left across the rows).

3.   Reducing the Incentive to Buy-In

As identified in Chapter III, buying in occurs in the competitive environment. In its current state, the TRIM is not truth revealing in a competitive environment although it does reduce the incentive to buy-in in some instances.

There are two types of buy-in. The first is when a firm proposes a low price because it is willing to lose money on a particular contract, either for competitive reasons or with the intent of earning back the money with profits from follow-on contracts. The second is when a firm is NOT willing to lose money on a particular contract, but proposes a low price with the intent of either obtaining a contract that does not punish cost overruns (poorly administered CPAF, or CPFF) or somehow renegotiating the contract later to ensure that the contract is profitable.

The first type of buy-in is not addressed by the current TRIM. The TRIM is not structured to address buy-in if a contractor is willing to lose fee for the opportunity of preventing award to competitors, entering a desirable market to gain experience, keeping their workforce intact, or getting follow-on work.

The second type of buy-in can be addressed when using the TRIM. The TRIM may not reveal a contractor's true cost but does discourage buy-in because the contractor shares the cost of any overrun. For example, CPFF contracts are at the greatest risk for buying–in because there are no post-award incentives to keep the contractor from overrunning the target cost. Since fees are fixed regardless of contract performance, a contractor can propose a target cost lower than their expected costs to undercut the competition and win the contract. In this case, the Government would adversely select a contractor under the pretense they will be able to fulfill the contract at a proposed target cost that was less expensive than the competition. The contractor would begin work knowing they would eventually overrun their target cost. The contractor would not be incentivized to take any corrective measures to minimize a cost over-run because the fee is fixed regardless of how close the relationship of actual cost to target cost.

CPAF contracts often fall prey to the same buying-in risks found in CPFF contracts. Although CPAF and CPFF contracts have different structures and rules, they display very similar characteristics in practice. In recent years, CPAF contracts have closely mirrored CPFF contracts, due to DoD's culpability in paying contractors the majority of award fees regardless of performance. According to a December 2005 GAO report entitled "DoD Has Paid Billions in Award and Incentive Fees Regardless of Acquisition Outcomes," the GAO's sample of 63 award fee contracts revealed the median percentage of fee awarded was 93 percent. [19] Paying award fee regardless of performance provides the same incentive as CPFF contracts. As a result, contractors can essentially employ the same strategic tactics they use on CPFF—strategically buying-in on a contract knowing that they will not be penalized for poor performance.

Figure 7, is a payout table that shows how contractors are incentivized to buy in on a CPFF contract or a poorly administered CPAF contract. As shown in the figure below, performance doesn't matter as the contractor will always earn the fixed fee. For example, a contractor can buy-in by proposing a target cost of $12M (Row 7) even though the contractor expects the effort to actually cost $13M (Column M), their fee will

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[19] Government Accountability Office.

always be $1.2M (Row 7), no matter how much they overrun the target cost. Figure 7 also shows that regardless of contract performance, it is in the contractor's best interest to propose the highest possible target cost (Row 12, highlighted in orange).

	A	B	C	D	E	F	G	H	I	J	K	L	M	
							Actual Cost							
1	Target Cost	$ 11,142,857	$ 11,314,286	$ 11,485,714	$ 11,657,143	$ 11,828,571	$ 12,000,000	$ 12,171,429	$ 12,342,857	$ 12,514,286	$ 12,685,714	$ 12,857,143	$ 13,028,571	
2	$ 11,142,857	$ 1,114,286	$ 1,114,286	$ 1,114,286	$ 1,114,286	$ 1,114,286	$ 1,114,286	$ 1,114,286	$ 1,114,286	$ 1,114,286	$ 1,114,286	$ 1,114,286	$ 1,114,286	
3	$ 11,314,286	$ 1,131,429	$ 1,131,429	$ 1,131,429	$ 1,131,429	$ 1,131,429	$ 1,131,429	$ 1,131,429	$ 1,131,429	$ 1,131,429	$ 1,131,429	$ 1,131,429	$ 1,131,429	
4	$ 11,485,714	$ 1,148,571	$ 1,148,571	$ 1,148,571	$ 1,148,571	$ 1,148,571	$ 1,148,571	$ 1,148,571	$ 1,148,571	$ 1,148,571	$ 1,148,571	$ 1,148,571	$ 1,148,571	
5	$ 11,657,143	$ 1,165,714	$ 1,165,714	$ 1,165,714	$ 1,165,714	$ 1,165,714	$ 1,165,714	$ 1,165,714	$ 1,165,714	$ 1,165,714	$ 1,165,714	$ 1,165,714	$ 1,165,714	
6	$ 11,828,571	$ 1,182,857	$ 1,182,857	$ 1,182,857	$ 1,182,857	$ 1,182,857	$ 1,182,857	$ 1,182,857	$ 1,182,857	$ 1,182,857	$ 1,182,857	$ 1,182,857	$ 1,182,857	
7	$ 12,000,000	$ 1,200,000	$ 1,200,000	$ 1,200,000	$ 1,200,000	$ 1,200,000	$ 1,200,000	$ 1,200,000	$ 1,200,000	$ 1,200,000	$ 1,200,000	$ 1,200,000	$ 1,200,000	
8	$ 12,171,429	$ 1,217,143	$ 1,217,143	$ 1,217,143	$ 1,217,143	$ 1,217,143	$ 1,217,143	$ 1,217,143	$ 1,217,143	$ 1,217,143	$ 1,217,143	$ 1,217,143	$ 1,217,143	
9	$ 12,342,857	$ 1,234,286	$ 1,234,286	$ 1,234,286	$ 1,234,286	$ 1,234,286	$ 1,234,286	$ 1,234,286	$ 1,234,286	$ 1,234,286	$ 1,234,286	$ 1,234,286	$ 1,234,286	
10	$ 12,514,286	$ 1,251,429	$ 1,251,429	$ 1,251,429	$ 1,251,429	$ 1,251,429	$ 1,251,429	$ 1,251,429	$ 1,251,429	$ 1,251,429	$ 1,251,429	$ 1,251,429	$ 1,251,429	Incentive
11	$ 12,685,714	$ 1,268,571	$ 1,268,571	$ 1,268,571	$ 1,268,571	$ 1,268,571	$ 1,268,571	$ 1,268,571	$ 1,268,571	$ 1,268,571	$ 1,268,571	$ 1,268,571	$ 1,268,571	to Raise
12	$ 12,857,143	$ 1,285,714	$ 1,285,714	$ 1,285,714	$ 1,285,714	$ 1,285,714	$ 1,285,714	$ 1,285,714	$ 1,285,714	$ 1,285,714	$ 1,285,714	$ 1,285,714	$ 1,285,714	Target
13	$ 13,028,571	$ 1,302,857	$ 1,302,857	$ 1,302,857	$ 1,302,857	$ 1,302,857	$ 1,302,857	$ 1,302,857	$ 1,302,857	$ 1,302,857	$ 1,302,857	$ 1,302,857	$ 1,302,857	Costs

No Incentive to decrease Actual Costs

Figure 7.   CPFF Fee-Payout Table

Contrary to a Cost-Plus Fixed Fee contract, a contract negotiated using the TRIM penalizes a contractor for trying to buy-in. Refer back to Figure 6 for the following example. If the contractor proposed a target cost of $12M (A6) even though the contractor expects the effort to actually cost $13M (Column M), the contractor would pay a share of the over-run costs and the fee earned would be $.891M (M6). If the contractor told the truth and proposed his true estimated cost of $13M (A12), they would earn a profit of $.935M (M12).

CPIF contracts and properly awarded CPAF contracts combat the tactic of buying-in in the same manner as the TRIM. CPAF contracts have the opportunity to reduce the likelihood of buying-in if cost control is part of the award fee criteria and the award fee is properly administered. Both CPIF and TRIM-based contracts have incentives based on a formula that relates target cost to actual cost. Both CPIF and TRIM-based contracts penalize contractors when actual costs exceed target costs and both reward contractors when actual costs are below target costs. This common incentive motivates contractors to work efficiently and reduce costs. Since the incentives are based on a relationship between target cost and actual cost, it would be detrimental to a contractor to propose a target price that's lower than the expected actual price.

Though CPIF, properly administered CPAF, and TRIM-based contracts have much in common, an important difference is that CPIF and CPAF contracts incentivize contractors to negotiate higher target costs, where TRIM-based contracts incentivize contractors to negotiate the true expected target cost.

To illustrate the difference between the CPIF and the TRIM-based contract, the same scenario is used from the previous CPFF example, a contractor building video sensors for the Predator UAV. In this example, however, a CPIF contract is used instead of a CPFF contract. The contractor estimates the development work will cost $12M and believes they will negotiate a reasonable fixed fee of 10%. The Government has established an under-run share ratio of 80/20 (Government/Contractor) and an over-run share ratio of 60/40 based on Government optimistic, pessimistic, and most-likely cost estimates.

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Actual Cost

	A	B	C	D	E	F	G	H	I	J	K	L	M
	Target Cost	$11,142,857	$11,314,286	$11,485,714	$11,657,143	$11,828,571	$12,000,000	$12,171,429	$12,342,857	$12,514,286	$12,685,714	$12,857,143	$13,028,571
1	$11,142,857	$1,114,286	$1,045,714	$977,143	$908,571	$840,000	$771,429	$702,857	$634,286	$565,714	$497,143	$428,571	$360,000
2	$11,314,286	$1,165,714	$1,131,429	$1,062,857	$994,286	$925,714	$857,143	$788,571	$720,000	$651,429	$582,857	$514,286	$445,714
3	$11,485,714	$1,217,143	$1,182,857	$1,148,571	$1,080,000	$1,011,429	$942,857	$874,286	$805,714	$737,143	$668,571	$600,000	$531,429
4	$11,657,143	$1,268,571	$1,234,286	$1,200,000	$1,165,714	$1,097,143	$1,028,571	$960,000	$891,429	$822,857	$754,286	$685,714	$617,143
5	$11,828,571	$1,320,000	$1,285,714	$1,251,429	$1,217,143	$1,182,857	$1,114,286	$1,045,714	$977,143	$908,571	$840,000	$771,429	$702,857
6	$12,000,000	$1,371,429	$1,337,143	$1,302,857	$1,268,571	$1,234,286	$1,200,000	$1,131,429	$1,062,857	$994,286	$925,714	$857,143	$788,571
7	$12,171,429	$1,422,857	$1,388,571	$1,354,286	$1,320,000	$1,285,714	$1,251,429	$1,217,143	$1,148,571	$1,080,000	$1,011,429	$942,857	$874,286
8	$12,342,857	$1,474,286	$1,440,000	$1,405,714	$1,371,429	$1,337,143	$1,302,857	$1,268,571	$1,234,286	$1,165,714	$1,097,143	$1,028,571	$960,000
9	$12,514,286	$1,525,714	$1,491,429	$1,457,143	$1,422,857	$1,388,571	$1,354,286	$1,320,000	$1,285,714	$1,251,429	$1,182,857	$1,114,286	$1,045,714
10	$12,685,714	$1,577,143	$1,542,857	$1,508,571	$1,474,286	$1,440,000	$1,405,714	$1,371,429	$1,337,143	$1,302,857	$1,268,571	$1,200,000	$1,131,429
11	$12,857,143	$1,628,571	$1,594,286	$1,560,000	$1,525,714	$1,491,429	$1,457,143	$1,422,857	$1,388,571	$1,354,286	$1,320,000	$1,285,714	$1,217,143
12	$13,028,571	$1,680,000	$1,645,714	$1,611,429	$1,577,143	$1,542,857	$1,508,571	$1,474,286	$1,440,000	$1,405,714	$1,371,429	$1,337,143	$1,302,857

Incentivie to Maximize Target Cost

Incentive to Lower Actual Costs

Figure 8.   CPIF Payout Table

Figure 8 is a payout table that shows how contractors are incentivized to maximize the target cost on a CPIF contract. The contractor is incentivized to work efficiently to decrease actual costs (move left across the columns). However, a contractor is also incentivized to inflate target costs (move down the rows). For example, a contractor expects the actual cost to be $12M (A6). According to the pay-out table, a standard CPIF contract encourages the contractor to inflate their target cost as high as possible (Row 12, highlighted in orange) in order to maximize fee.

4.   Reducing Moral Hazard

Moral hazard occurs in the contract administration phase when contractors act in their own interest at the expense of the Government because it is costly or impossible for the Government to monitor them. CPFF and poorly administered CPAF contracts are highly susceptible to moral hazard because fees are paid in full regardless of performance. This scenario leaves the Government open to a moral hazard in which the contractor uses their "B-Team" or less efficient employees to work on the contract with a guaranteed fee, while saving their more efficient workers for contracts that incentivize efficient work and minimized costs. Fees paid regardless of performance also provide contractors no incentive to reduce costs and spend tax payer dollars wisely.

The Government's standard approach to combating moral hazard, and countering any post-award opportunism, relies on external controls. The Government buys adherence to their interests through oversight and insight—financial reports, program status reports and active monitoring by DCMA reps and program office managers. External monitoring is costly and resource intensive and provides the Government a retrospective view of costs incurred. Internal controls, in the form of contract incentives that align Government and contractor objectives, are a more cost effective way to ensure contractors act in the Government's best interest.

CPIF, properly administered CPAF, and TRIM contracts all incentivize efficiency. A contract using the TRIM reduces moral hazard because of the cost-sharing

mechanism. For example, using inefficient workers or careless contract performance could lead to schedule delays and resulting cost overruns that are penalized under the TRIM-based contract.

E. WHAT OTHER BENEFITS DOES TRIM OFFER?

In addition to minimizing principal-agent problems, the TRIM offers many other benefits. The following section explains how the TRIM helps generate more accurate cost estimates and may decrease bargaining/negotiating, information, policing, and enforcement costs.

1. More Accurate Cost Estimates

Because the TRIM is truth revealing, the Government has better insight into the true costs of projects, or at least what the contractor believes to be their true costs. In CPFF and some CPAF contracts, contractors may be incentivized to buy-in if expected costs exceed the budget available, knowing that their agreed upon target cost will be less than the actual contract cost. Alternatively, contractors may be incentivized to overstate costs, if the available budget allows, to increase their award fee pool. The TRIM helps the Government ascertain accurate cost estimates up front and saves either the time and/or money it takes to repeatedly return to the financial coffers for additional funding or the excessive costs of an overstated cost target.

2. Bargaining/Negotiating Costs

The output of the TRIM is a contract menu from which a contractor chooses; the contractor picks his own contract. Incentives are configured so the contractor earns a higher fee if they reveal the truth. With Government and contractor objectives aligned, the scenario becomes win-win and there is no need for long, drawn out negotiations. Negotiations using the TRIM are short and save time.

3. Information Costs

The TRIM helps minimize information asymmetry during contract negotiation by aligning principal and agent objectives. With misaligned objectives, where the contractor is incentivized to misstate their proposed costs, the Government must acquire information to reveal true costs. Acquiring cost and pricing information from contractors is costly. The TRIM helps minimize the Government need to gather information about a company prior to contract award.

4. Policing and Enforcement Costs

Detecting post-contractual opportunism during the administration of a contract is costly. The Government must use resources such as Defense Contract Management Agency (DCMA) to ensure contractors are working efficiently. As stated previously in the discussion of moral hazards found in CPFF and CPAF contracts—contractors are incentivized to use their "B-Team" when "A-Team" players were negotiated. The TRIM incentives are configured so the contractor is rewarded for putting their best people on the job and working as efficiently as possible.

The many benefits listed above explain why the TRIM should be applied to DoD contracts. The next chapter discusses where the TRIM can be applied in the DoD contracting environment. Chapter V also explains how the Gates mechanism, the precursor to the TRIM, was modified to fit the boundaries of the Federal Acquisition Regulations. The explanation provides the reader a better understanding of where the TRIM can be used in real-world environments.

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V. APPLICATIONS TO DOD CONTRACTING AND EVOLUTION OF THE TRIM

The authors found value in the initial mechanism's concept and determined the purported benefits could not go uninvestigated. Knowing a contractor's true cost helps level the playing field when negotiating contracts. The TRIM is a tool that moves the Government closer to this ideal environment. This chapter explains: where the TRIM can be applied in DoD contracts, how and why the original mechanism was modified to fit within the guidelines of the Federal Acquisition Regulation, and observations about the mechanism's responses to repeated simulations.

A. WHERE THE TRIM CAN BE APPLIED TO DOD CONTRACTING

The TRIM can be used in negotiating all cost-plus-award fee/incentive fee (CPAF/IF) contracts regardless of whether or not competition exists. The premise remains the same. Using the TRIM combats principal-agent problems by aligning both contractor and Government objectives.

1. The Competitive Environment

Development and design work performed for the Government is usually procured using a cost-reimbursable type contract due to uncertainty in estimating the effort necessary to fulfill the requirement. Cost-reimbursement contracts are appropriate when uncertainties involved in contract performance preclude estimating costs with sufficient accuracy to use any type of fixed-price contract.[20] The TRIM reduces principal-agent problems in a competitive environment. However, in its current state, the TRIM only incentivizes contractors to reveal their true costs in a sole-source environment.

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[20] Federal Acquisition Regulation.

2. Sole-source Environment

Environments where competition is absent, otherwise described as a sole source environment, give the contractor leverage to obtain a higher price than if competition was present. Specifically, it is in this type environment that the TRIM provides the greatest value and can best be applied. When market forces are absent, the contractor has a more advantageous negotiating position and can command a premium for their service. The TRIM offers a higher target fee when the contractor chooses a lower target cost, refraining contractors from selecting an inflated target cost.

a. Proprietary Information

Major weapon systems being acquired in today's environment are very costly and technologically complex. Most often the Government declines to purchase full data rights to weapons systems because it's cost prohibitive. In declining the data purchase, the Government must return to the original weapon system equipment manufacturer for future work specific to that weapon system.

Modifications and upgrades to a weapon system are a staple in the warfighter's diet. Weapon systems are continually being modified today to outfit them with the latest and greatest capabilities. Due to proprietary data the contractor holds, the Government succumbs to submitting a justification and approval to negotiate and contract with the source holding the proprietary information. In these situations the contractor knows they are the best value choice to accomplish the Government requirement and can use this favored position to their advantage. Again, the TRIM incentivizes the contractor to select their true estimated cost instead of an inflated target cost.

b. Previously Competed Contracts

To reduce procurement lead time, acquisition professionals often award new requirements on previously competed contracts to a sole-source. This contract vehicle eliminates the time intensive effort of competing a requirement. The approval

process for going sole source is eliminated. The contracting officer simply adds a new requirement, usually in the form of a task or delivery order, to the master contract. This practice reduces the time between receiving the requirement and when the contractor starts work. Obviously, this is highly preferred by both acquisition personnel, for the work eliminated, and by the warfighter for the decreased time in fielding the needed capability.

Using pre-negotiated contracts, however, comes with consequences. Competition is eliminated as the request for proposal goes only to the company executing under the previously competed contract. Price negotiation between the Government and contractor still occurs, but the "previously competed/sole source contract" provides the contractor an advantaged negotiating position to maximize profit.

B.   MODIFICATIONS TO THE TRIM

Modifications were made to the initial truth revealing mechanism to adapt its applicability to Government contracting. The initial mechanism evolved into the TRIM by incorporating FAR mandated policies, financial and program management concerns.

1.   Initial Mechanism Modifications

The mechanism was modified to incorporate important factors necessary for its use in the DoD contracting environment. These factors include budget considerations, FAR policy guidelines, target cost development, and subjectivity. Adding these factors enhances the mechanism's value and makes the mechanism easier for contracting officer to use while remaining mathematically sound.

2.   Budget Considerations

The initial mechanism failed to account for budget considerations. A budget constraint was added to the original mechanism to alert a contracting officer when there are insufficient funds to award a contract. No matter what type of structure is

constructed; the award amount can not exceed the budgeted/authorized amount. Exceeding the authorized budget in awarding a contract is a violation of the Anti-deficiency Act.

3. Use of a Structured Approach for Estimating Profit Percentage

The initial mechanism created a fee range based on the economic concept of individual rationality. The minimum fee was determined to be the minimum fee the contractor would willingly accept to enter into a contract. The maximum fee had no upper bounds since it was based on a percentage of cost savings. The mechanism's potential fee range needed to be modified because it is very difficult for a Government contracting officer to determine a contractor's individuality rationality. The initial mechanism also didn't consider DFAR guidelines in determining a fair and reasonable fee. DFAR 215.404-4 mandates that negotiated cost reimbursement contracts use a structured approach to create a fee value that accounts for appropriate risk to the contractor given the work proposed.[21] In developing the TRIM, the weighted guidelines method was chosen to make a value determination of potential fee. Using the weighted guidelines, DoD Form 1547, should facilitate a correct fee calculation. Historical profits for projects similar in complexity and size should be used to determine the entries to the DoD Form 1547. The resulting fee becomes the center of the target fee range as it complements the Government's target cost figure.

4. Development of the Target Cost

To create the proper target cost, the initial mechanism accounted for an Independent Government Estimate (IGE) and the lone contractor's offer. Modifications to improve target cost fidelity involved including not only the IGE and the contractor's offer but also any competing offers by other contractors, market research, history of similar or near similar efforts, and the Cost Analysis Improvement Group (CAIG)

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[21] DoD Supplement to Federal Acquisition Regulations. Current Through DCN 20071108, November 2007.

estimates when entering milestone B or C. The more estimates, whether point or range, the better chance of presenting a range of cost targets that encompass the contractor's estimated true cost.

5. Necessary Addition of Subjectivity

The initial contracting mechanism was purely objective because the mechanism focused solely on cost. This caused the contractor to elevate cost to the most important factor when making program decisions, regardless of Government priority. To adapt the mechanism for use in CPAF contracts, the total potential fee pool must be divided into amounts that address both objective and subjective evaluations. Using a CPAF contract recognizes the importance of retaining control over areas other than cost deemed important, such as management responsiveness, schedule, quality, and technical performance.

Focusing solely on cost reduces the Government program manager's ability to subjectively evaluate the contractor and control aspects of the program other than cost. An amount of subjectivity is needed to maintain and foster the Government-contractor relationship.

C. TRIM OBSERVATIONS

1. Constrained Budget and Insufficient Funds

TRIM explores budget realism by including budget data specific to a potential contract. This data provides a means to alert contracting officers, program managers, and financial personnel to budget concerns. When the TRIM parameters result in a total contract cost for the more expensive cost targets that exceed the total budget, TRIM includes a cell that shows "Budget Constrained". Under a constrained budget, the upper bound of the target cost range is adjusted to the constrained budget and does not include the full target cost range that would be included without the budget constraint. The target

costs above and below the expected target cost loose their symmetry in this case. See Figure 9. While the incentive to reveal true cost remains, the incentive (risk) to the contractor is reduced.

CONTRACT MENU INPUTS			Contract Menu				Fee % of
		Target Cost	Share Ratio	Target Fee		Cost Total	Target Cost
Target Cost	$ 35,000.00	$ 31,500	0.500	$ 5,644	$ 37,144	17.9%
Target Cost Range (±%)	10.00%	$ 32,000	0.475	$ 5,400	$ 37,400	16.9%
Target Fee	12%	$ 32,500	0.450	$ 5,169	$ 37,669	15.9%
Max Share Ratio	0.5	$ 33,000	0.425	$ 4,950	$ 37,950	15.0%
Min Share Ratio	0.15	$ 33,500	0.400	$ 4,744	$ 38,244	14.2%
		$ 34,000	0.375	$ 4,550	$ 38,550	13.4%
Less than the 10%		$ 34,500	0.350	$ 4,369	$ 38,869	12.7%
input as range		$ 35,000	0.325	$ 4,200	$ 39,200	12.0%
		$ 35,150	0.300	$ 4,153	$ 39,303	11.8%
		$ 35,300	0.275	$ 4,110	$ 39,410	11.6%
		$ 35,450	0.250	$ 4,071	$ 39,520	11.5%
Smaller $ intervals		$ 35,600	0.225	$ 4,035	$ 39,635	11.3%
		$ 35,749	0.200	$ 4,003	$ 39,753	11.2%
		$ 35,899	0.175	$ 3,975	$ 39,874	11.1%
		$ 36,049	0.150	$ 3,951	$ 40,000	11.0%
Budget	$ 40,000.00	Budget Constrained				

Figure 9.   Budget Constrained TRIM

While the effectiveness of the TRIM is not reduced, the Government budget boundaries clearly limit the contract option choices available to the contractor and weaken the incentives for truth revelation. The option desired by the contractor whose expected costs exceed the target cost may not be available if budget constrained. The notification of "Budget Constrained" reveals a restricted Government position in offering contract options with a higher target if their expected costs exceed the total budget. The Government's financial boundaries are binding when a budget constrained situation occurs.

Entering a target cost amount close in value to your budget constraint activates a cell to show "Insufficient Funds." This causes your target cost values to descend on not just one side of the target cost, as normal, but both. See Figure 10. This indicator alerts the contracting officer that awarding this contract near or above the expected target cost is not possible given the appropriated budget. The contracting officer should relay this

information to the program manager for consideration. Two results may come about: increase the budget by adding additional funds or re-scope the requirement.

CONTRACT MENU INPUTS

		Contract Menu				
						Fee % of
Target Cost	$ 38,500.00	Target Cost	Share Ratio	Target Fee	Cost Total	Target Cost
Target Cost Range (±%)	10.00%	$ 34,650	0.500	$ 6,208	$ 40,858	17.9%
Target Fee	12%	$ 35,200	0.475	$ 5,940	$ 41,140	16.9%
Max Share Ratio	0.5	$ 35,750	0.450	$ 5,686	$ 41,436	15.9%
Min Share Ratio	0.15	$ 36,300	0.425	$ 5,445	$ 41,745	15.0%
		$ 36,850	0.400	$ 5,218	$ 42,068	14.2%
		$ 37,400	0.375	$ 5,005	$ 42,405	13.4%
		$ 37,950	0.350	$ 4,806	$ 42,756	12.7%
		$ 38,500	0.325	$ 4,620	$ 43,120	12.0%
		$ 37,915	0.300	$ 4,803	$ 42,718	12.7%
		$ 37,331	0.275	$ 4,971	$ 42,302	13.3%
		$ 36,746	0.250	$ 5,124	$ 41,871	13.9%
Non-normal		$ 36,162	0.225	$ 5,263	$ 41,425	14.6%
descending amounts		$ 35,577	0.200	$ 5,387	$ 40,964	15.1%
		$ 34,993	0.175	$ 5,497	$ 40,490	15.7%
		$ 34,408	0.150	$ 5,592	$ 40,000	16.3%
Budget	$ 40,000.00	Budget Constrained				
		Insufficient Funds				

Figure 10.   TRIM Showing Insufficient Funds

2.   Negative Fees

Using an unconstrained budget, a large target range around the target cost can cause the target fee to become negative at the higher end of the target cost range. A negative fee provides an important signal to the contracting officer inputting the data. Considering that the TRIM is a truth revealing mechanism, contractors would only select these higher cost targets if they reflected their expected actual costs. Furthermore, the contractor would balk at entering into a contractual agreement that starts with a negative fee for expected actual costs. This indicates that the share ratio amounts or award fee pool are not appropriate for the amount of risk involved (the potential range of actual expected costs). See Figure 11.

CONTRACT MENU INPUTS									Fee % of
			Contract Menu						
			Target Cost	Share Ratio	Target Fee			Cost Total	Target Cost
Target Cost	$ 35,000.00								
Target Cost Range (±%)	30.00%		$ 24,500	0.700	$ 9,450		$	33,950	38.6%
Target Fee	9%		$ 26,000	0.671	$ 8,421		$	34,421	32.4%
Max Share Ratio	0.7		$ 27,500	0.643	$ 7,436		$	34,936	27.0%
Min Share Ratio	0.3		$ 29,000	0.614	$ 6,493		$	35,493	22.4%
			$ 30,500	0.586	$ 5,593		$	36,093	18.3%
Share ratios not			$ 32,000	0.557	$ 4,736		$	36,736	14.8%
reflective of huge			$ 33,500	0.529	$ 3,921		$	37,421	11.7%
cost range			$ 35,000	0.500	$ 3,150		$	38,150	9.0%
			$ 36,500	0.471	$ 2,421		$	38,921	6.6%
			$ 38,000	0.443	$ 1,736		$	39,736	4.6%
			$ 39,500	0.414	$ 1,093		$	40,593	2.8%
			$ 41,000	0.386	$ 493		$	41,493	1.2%
			$ 42,500	0.357	$ (64)	Negative Fee	$	42,436	-0.2%
			$ 44,000	0.329	$ (579)	not an error	$	43,421	-1.3%
			$ 45,500	0.300	$ (1,050)		$	44,450	-2.3%
Budget	$ 45,000.00		-						

Figure 11.   TRIM Showing Negative Fee

Now that you have a better idea of how the TRIM was derived and where it applies, the next logical step is implementation. The following chapter provides the authors conclusion and recommendations on how the TRIM should be simultaneously implemented by DoD in the cost-reimbursement, sole-source environment while being further researched by Naval Postgraduate School academia to expand the TRIM's usefulness across other contract environments.

VI. CONCLUSION AND RECOMMENDATIONS

Principal-agent relationship problems exist in all contractual relationships—especially cost reimbursement contracts. Contractor opportunism such as: artificially inflating target costs when market forces are absent, buying-in to win a contract award and using the "B-Team" to execute a contract are strategic behaviors that contractors often employ to further their objectives at the Government's expense. These types of principal agent problems contribute to the cost over-runs that plague so many DoD procurements. The authors of this research paper found value in the Gates mechanism that addressed these types of principal agent problems. The mechanism, although useful in theory, did not fit into the boundaries of the DoD contracting environment. The authors endeavored to create a bridge from theory to application. This research paper described that journey.

Given additional time for exploration and implementation of the TRIM concept, the authors recommend the following actions to provide additional insight into TRIM's applicability to Government Contracting. These recommendations should aid in the TRIM's transition from theory to application:

A. TEST AND IMPLEMENT THE MECHANISM

First, suggest that Naval Postgraduate School faculty members from the economic and contracting disciplines perform a beta test of the mechanism in a mock negotiation situation. Upon completing this mock negotiation, identifying the resulting lessons learned, and implementing any modifications necessary; a test of the mechanism on a low dollar value, short period of performance negotiated procurement would reveal valuable data. Using the current proposed TRIM is a viable option that meets FAR policy guidelines for handling negotiated procurements in a sole-source environment.

Second, upon successful beta test, the TRIM mechanism and user's guide should be distributed to the Air Force Deputy Assistant Secretary for Contracting (SAF/AQC) and service equivalents, for review and implementation. Suggest that SAF/AQC assign

responsibility to test the TRIM on a relatively low-risk, sole-source, cost-reimbursement contract. That contracting office should report back to SAF/AQC on the effectiveness of the TRIM in negotiations and contract administration.

B.   CONDUCT FURTHER RESEARCH ON HOW THE TRIM CAN BE APPLIED IN COMPETITIVE ENVIRONMENTS TO ALL OFFERERS IN THE COMPETITIVE RANGE

The authors propose two recommendations for applying the TRIM within the competitive environment. One, it is imperative to investigate how to fairly and equitably use the TRIM with all offerors in the competitive range. The initial mechanism was constructed to be used with the winning contractor selected from contractors in the competitive range. Arguably, this approach is contrary to what is practiced today and mandated by the FAR. Additionally, consideration must be given to identifying the intent to use the TRIM in the solicitation.

Two, recommend further research into modifying the TRIM to better combat against the problem of buy-in. In its current state, the TRIM only addresses one type of buy-in. Even when the TRIM addresses buy-in, it does not force the contractor to reveal the truth. Obtaining a contractor's true cost will aid the government in controlling costs.

The authors suggest limiting the TRIM implementation to only a sole-source environment until the TRIM can be further tested and the affects on contractors operating in a competitive environment are understood.

C.   CONDUCT FURTHER RESEARCH ON HOW CONTRACTOR RISK AVERSION AFFECTS THE TRIM

Further study into quantifying contractor risk aversion and its affect on the TRIM mechanism construction should be investigated. Methods of determining risk aversion would be beneficial as no two contractors are equally risk averse. Risk aversion may also alter the share ratio as less risk adverse contractors may desire higher ratios.

D. **CONDUCT FURTHER RESEARCH ON INDIVIDUAL RATIONALITY OR THE LOWEST FEE REQUIRED FOR A CONTRACTOR TO SELECT ONE OF THE TRIM CONTRACT OPTIONS**

Different contractors require different returns on investment. In using the TRIM to negotiate with different contractors across different contracts, individual rationality differs for each and therefore the mechanism must also differ. Comprehensive market research into who can fulfill the requirement as well as their current business position should help determine the individual rationality for each.

In summary, it is the authors' contention that the TRIM can be used successfully to reduce the rampant cost-overrun problems seen in DoD acquisitions. The TRIM addresses principal-agent problems more effectively than any other cost-reimbursement contract type currently used by the DoD. Although in its infancy, the TRIM is ready to be used to negotiate and administrate CPAF/IF contracts in a sole-source environment. SAF/AQC and other service equivalents should consider implementing the TRIM. The Naval Postgraduate School academia should conduct further research to bolster the fidelity of the TRIM and broaden its applicability, specifically in the competitive environment.

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APPENDIX: THE TRIM USER'S GUIDE

A.   PURPOSE

The purposes of this user's guide is to introduce Government contracting professionals to the Truth Revealing Incentive Mechanism (TRIM) and explain how the TRIM can be used in the negotiation and administration of cost plus award fee/incentive fee (CPAF/IF) contracts.

The TRIM is an economic mechanism, based on principal-agent relationships, that uses incentives to align contractors' interests with those of the Government. The TRIM was designed for cost reimbursement contracts. Specifically, the TRIM is intended to be used on CPAF/IF contracts. The mechanism is called "truth revealing" because it structures incentives so the contractor will select a contract option that most closely reflects their expected cost. In other words, the incentive structure ensures the contractor maximizes expected fees by choosing a low cost target if expected costs are low, and by choosing a high cost target if expected costs are high.

The user's guide is broken down into three sections. The first section gives a step-by-step explanation on how to use the TRIM. The second provides a fee pay-out table to explain how the TRIM incentivizes contractors to reveal their true costs. The third explains how to administer the fee on a CPAF/IF contract using the TRIM.

B.   HOW THE TRIM INCENTIVIZES CONTRACTORS TO REVEAL TRUE COST DURING NEGOTIATIONS

Simply put, the TRIM generates a variety of contract options from which a contractor can choose. The options provided by the TRIM read like a restaurant menu. Each option on the menu has three components listed in the columns: target cost, share ratio, and target fee. Each row on the menu is an contract option available to the contractor. Each row is a packaged deal—the contractor can not select a target cost from

one row, and a share ratio or target fee from another. Figure 12 is an example of a contract menu established by the TRIM. The highlighted row signifies one of the many options available.

Contract Menu		
Target Cost	Share Ratio	Target Fee
$ 4,050,000	0.600	$ 759,375
$ 4,114,286	0.568	$ 721,837
$ 4,178,571	0.536	$ 686,365
$ 4,242,857	0.504	$ 652,959
$ 4,307,143	0.471	$ 621,620
$ 4,371,429	0.439	$ 592,347
$ 4,435,714	0.407	$ 565,140
$ 4,500,000	0.375	$ 540,000
$ 4,564,286	0.343	$ 516,926
$ 4,628,571	0.311	$ 495,918
$ 4,692,857	0.279	$ 476,977
$ 4,757,143	0.246	$ 460,102
$ 4,821,429	0.214	$ 445,293
$ 4,885,714	0.182	$ 432,551
$ 4,950,000	0.150	$ 421,875

Figure 12.   TRIM-based Contract Menu

Incentives are structured so the contractor has the potential to earn the highest fee if he/she chooses the contract closest to their expected costs. The TRIM is truth revealing because of the relationship set-up between the target cost, share ratio, and the target fee. As the cost target increases, the sharing ratio and the target fee decrease.

Here are a few examples of how the TRIM helps reveal the truth from a contractor trying to "game" the system. Many cost-reimbursement contracts establish their target fee as a percentage of target cost. By establishing target fee as a percentage of cost, a contractor is incentivized to inflate target costs as high as possible to gain a larger target fee and reduce risk. This type of gamesmanship is common in sole source environments where competitive market forces are absent. The TRIM combats this strategy by structuring incentives so choosing a higher target cost leads to a lower target

fee. The TRIM also decreases the contractor share ratio as target costs increase so that the under-run incentive becomes less enticing.

Another example of contractors trying to game the system is when a contractor "buys in" to increase their chance of winning a contract. A contractor buys in on a contract when they propose a target cost lower than their estimated true cost. At first glance, Figure X gives the impression that it's lucrative for a contractor to buy-in—the target fee increases as the target cost decreases. However, in this case, it is the share ratio function of the mechanism that incentivizes the contractor to reveal true cost. The lower the target cost, the higher the share ratio. A higher share ratio creates a stronger incentive for not exceeding target cost. As a result of buying-in, the contractor is bound by the chosen option's share ratio that decreases target fee at a rate faster than the contractor's estimated true cost option not chosen. Again, through the use of the TRIM, the contractor is incentivized to reveal their true costs for potential of receiving the highest fee.

The remainder of this chapter will give step-by-step instructions on entering inputs into the TRIM so a menu of contracts can be developed for the contractor.

1.   Target Cost

The target cost is the first item to enter into the TRIM. The target cost is synonymous with most-likely cost. The Government should determine the most likely cost by taking the following cost estimates and information into consideration: market research data, historical cost data, the selected contractor's proposed target cost, independent Government cost estimate, and the proposed target costs of other offerers in the competitive range.

When considering the above mentioned cost estimates, it is important to make an "apples-to-apples" comparison by identifying the factors affecting comparability (scope, assumptions, terms and conditions, etc.), determining the affects of those factors, and adjusting each cost estimate taking these factors into consideration. Cost data should already be normalized during the source selection, when comparing proposals in choosing the best-value contractor. Using the normalized cost estimates, enter the

average target cost value into the target cost cell of the TRIM. Figure 13, gives an example of $35,000 being entered as the target cost.

TRUTH REVEALING NEGOTIATIONS MODEL

CONTRACTS MENU INPUTS			Contract Menu					
			Target Cost	Share Ratio	Target Fee		Cost Total	Fee % of Target Cost
Target Cost	$ 35,000.00		$ 35,000	0.000	$ -		$ 35,000	0.0%
Target Cost Range (±%)			$ 35,000	0.000	$ -		$ 35,000	0.0%
Target Fee			$ 35,000	0.000	$ -		$ 35,000	0.0%
Max Share Ratio			$ 35,000	0.000	$ -		$ 35,000	0.0%
Min Share Ratio			$ 35,000	0.000	$ -		$ 35,000	0.0%
			$ 35,000	0.000	$ -		$ 35,000	0.0%
			$ 35,000	0.000	$ -		$ 35,000	0.0%
			$ 35,000	0.000	$ -		$ 35,000	0.0%
			$ 35,000	**0.000**	**$ -**		$ 35,000	0.0%
			$ 35,000	0.000	$ -		$ 35,000	0.0%
			$ 35,000	0.000	$ -		$ 35,000	0.0%
			$ 35,000	0.000	$ -		$ 35,000	0.0%
			$ 35,000	0.000	$ -		$ 35,000	0.0%
			$ 35,000	0.000	$ -		$ 35,000	0.0%
			$ 35,000	0.000	$ -		$ 35,000	0.0%
			$ 35,000	0.000	$ -		$ 35,000	0.0%
Budget	#############				-			

Figure 13.   Target Cost Input

After entering the target cost into the TRIM, every target cost option available on the menu of contracts will be the same. Don't worry, this is normal. All the target costs on the contract menu will be the same until the target cost range is entered. Only the target cost value on the menu, highlighted in bold above, will remain the same.

2.   Target Cost Range

Target cost range is the second input to enter into the TRIM. Since the target cost estimate entered in step 1 is only a point estimate, it is likely there will be variation between the target cost and actual cost. Consequently, a variance percentage must be entered into the TRIM to account for cost variability. For example, if actual costs are suspected to fall somewhere within ±10% of the target cost, 10% should be entered into your target cost range (shaded red in Figure 14). This changes the values in the target cost column of the contract menu allowing the selected contractor to choose a contract that falls within ±10% of the chosen target cost. Figure 14 shows how the 10% cost target range affects target costs on the contracts menu.

CONTRACTS MENU INPUTS		Contract Menu					
							Fee % of
Target Cost	$ 35,000.00	Target Cost	Share Ratio	Target Fee		Cost Total	Target Cost
Target Cost Range (±%)	10.00%	$ 31,500	0.000	$ -		$ 31,500	0.0%
Target Fee		$ 32,000	0.000	$ -		$ 32,000	0.0%
Max Share Ratio		$ 32,500	0.000	$ -		$ 32,500	0.0%
Min Share Ratio		$ 33,000	0.000	$ -		$ 33,000	0.0%
		$ 33,500	0.000	$ -		$ 33,500	0.0%
		$ 34,000	0.000	$ -		$ 34,000	0.0%
		$ 34,500	0.000	$ -		$ 34,500	0.0%
		$ 35,000	**0.000**	**$ -**		$ 35,000	0.0%
		$ 35,500	0.000	$ -		$ 35,500	0.0%
		$ 36,000	0.000	$ -		$ 36,000	0.0%
		$ 36,500	0.000	$ -		$ 36,500	0.0%
		$ 37,000	0.000	$ -		$ 37,000	0.0%
		$ 37,500	0.000	$ -		$ 37,500	0.0%
		$ 38,000	0.000	$ -		$ 38,000	0.0%
		$ 38,500	0.000	$ -		$ 38,500	0.0%
Budget	#############			-			

-10%

+10%

Figure 14.   Target Cost Range Input

The original target cost ($35,000) placed in the contract menu middle acts as an anchor. The target cost options on the menu located above the original target cost decrease linearly until reaching 10% below the original target cost. Similarly, the target cost options on the menu located below the original target cost increase linearly until reaching 10% above your original target cost.

When determining the percentage to use for the target cost range, risk of current market conditions and performance risk of the contractor should be considered. Performance risks can include but are not limited to: type and complexity of item/service being purchased, contractor past performance in similar efforts, availability of historical data, urgency of the requirement, technical maturity of the system, and extent and nature of subcontracting.[22]

3.   Target Fee

The third column in the contracts menu is target fee. Target fee is the "potential" fee a contractor will earn if cost, schedule, and performance requirements are met at target cost. Similar to how a single target cost was used to fill an entire menu of target

_____
[22] Contract Pricing Reference Guide. (Vol. 4). Retrieved October 15, 2007 from: http://www.acq.osd.mil/dpap/cpf/contract_pricing_reference_guides.html.

cost options in step 1, a single target fee value to determine an entire menu of target fee options for the contractor is used. The single target fee value is a percentage of the target cost determined in step 1. In determining a fair and reasonable target fee percentage, guidance from the Federal Acquisition Regulation was sought.

The Federal Acquisitions Regulation (FAR 15.404-4 Profit)[23] mandates each agency use a structured approach when determining profit or fee for negotiated acquisitions that require cost analysis. The Department of Defense has their own structured approach, the weighted guidelines method, for determining fair and reasonable fee. Instructions for using the weighted guidelines method can be found in the Department of Defense Federal Acquisition Regulation Supplement (DFARS 215.404-70)[24]. This DFARS instruction guides the user in how to fill out the DD Form 1574, Record of Weighted Guidelines Application. Completing DD Form 1574 calculates a fair and reasonable fee percentage for entry into the TRIM (shaded red in Figure 15). Since the TRIM is used in CPAF contracts, weighted guidelines are not mandatory. That given; the weighted guidelines should only be used as a starting point to find a fair and reasonable range for target fees. Also consider investigating the range of fees used in past CPAF contracts for similar efforts.

TRUTH REVEALING NEGOTIATIONS MODEL

CONTRACTS MENU INPUTS			Contract Menu					Fee % of
			Target Cost	Share Ratio	Target Fee		Cost Total	Target Cost
Target Cost	$ 35,000.00		$ 31,500	0.000	$ 4,200		$ 35,700	13.3%
Target Cost Range (±%)	10.00%		$ 32,000	0.000	$ 4,200		$ 36,200	13.1%
Target Fee	12%		$ 32,500	0.000	$ 4,200		$ 36,700	12.9%
Max Share Ratio			$ 33,000	0.000	$ 4,200		$ 37,200	12.7%
Min Share Ratio			$ 33,500	0.000	$ 4,200		$ 37,700	12.5%
			$ 34,000	0.000	$ 4,200		$ 38,200	12.4%
			$ 34,500	0.000	$ 4,200		$ 38,700	12.2%
			$ 35,000	**0.000**	**$ 4,200**		$ 39,200	12.0%
			$ 35,500	0.000	$ 4,200		$ 39,700	11.8%
			$ 36,000	0.000	$ 4,200		$ 40,200	11.7%
			$ 36,500	0.000	$ 4,200		$ 40,700	11.5%
			$ 37,000	0.000	$ 4,200		$ 41,200	11.4%
			$ 37,500	0.000	$ 4,200		$ 41,700	11.2%
			$ 38,000	0.000	$ 4,200		$ 42,200	11.1%
			$ 38,500	0.000	$ 4,200		$ 42,700	10.9%
Budget	############		-					

Figure 15.   Target Fee Input

[23] Federal Acquisition Regulations.

[24] DoD Supplement to the Federal Acquisition Regulations.

Once the target fee percentage has been entered, the TRIM automatically multiplies the target fee percentage by the target cost to determine the dollar value for the target fee. In Figure 15, every target fee option available on the menu of contracts is the same. Don't worry, this is normal. All target fee values on the contract menu will be the same until entry of the share ratios occurs in the next two steps. The only target fee option remaining the same is the middle target fee value on the menu, highlighted in bold in Figure 15. Once minimum and maximum share ratios are entered, it will calculate the fee options based on the original target fee input, target cost options, and share ratios.

4. Maximum Share Ratio

In the context of using the TRIM, sharing ratio is defined as the percentage of risk assumed by the contractor. For example, if the sharing ratio is 60%, the contractor assumes 60% of the risk when the target cost deviates from the actual cost. If the contractor performed well, causing the actual cost to be lower than the target cost—the contractor earns 60 cents of every dollar under the target cost. Conversely, if the contractor performed poorly, causing actual cost to be higher than the target cost—60 cents of every dollar over the chosen target cost is deducted from the target fee. Maximum share ratio should be determined by considering the upper limit of risk a prudent contractor would be willing to accept on this particular contract given current market conditions. A point to consider, the closer the contractor's share ratio approaches 100%, the closer the contract mimics a firm fixed price arrangement. Figure 16 shows how a maximum share ratio of 60% (highlighted in red) populates the share ratio column as well as alters the target fee column of the contract menu. Until a minimum share ratio is entered, the TRIM assumes the minimum share ratio is zero and populates the share ratio column linearly from 60% down to a 0% share ratio.

CONTRACTS MENU INPUTS		Contract Menu					
							Fee % of
		Target Cost	Share Ratio	Target Fee		Cost Total	Target Cost
Target Cost	$ 35,000.00	$ 31,500	0.600 $	5,775	$	37,275	18.3%
Target Cost Range (±%)	10.00%	$ 32,000	0.557 $	5,486	$	37,486	17.1%
Target Fee	12%	$ 32,500	0.514 $	5,218	$	37,718	16.1%
Max Share Ratio	0.6	$ 33,000	0.471 $	4,971	$	37,971	15.1%
Min Share Ratio		$ 33,500	0.429 $	4,746	$	38,246	14.2%
		$ 34,000	0.386 $	4,543	$	38,543	13.4%
		$ 34,500	0.343 $	4,361	$	38,861	12.6%
		$ **35,000**	**0.300 $**	**4,200**	$	39,200	12.0%
		$ 35,500	0.257 $	4,061	$	39,561	11.4%
		$ 36,000	0.214 $	3,943	$	39,943	11.0%
		$ 36,500	0.171 $	3,846	$	40,346	10.5%
		$ 37,000	0.129 $	3,771	$	40,771	10.2%
		$ 37,500	0.086 $	3,718	$	41,218	9.9%
		$ 38,000	0.043 $	3,686	$	41,686	9.7%
		$ 38,500	0.000 $	3,675	$	42,175	9.5%
Budget	#############		-				

Figure 16.   Maximum Share Ratio Input

5.   Minimum Share Ratio

In the context of using the TRIM, sharing ratio is defined as the percentage of risk assumed by the contractor. For example, if the sharing ratio was 15%, the contractor assumes 15% of the risk the target cost will deviate from the actual cost of the contract. If the contractor performs well, resulting in an actual cost lower than the target cost—the contractor earns 15 cents of every dollar of the under-run. Conversely, if the contractor performs poorly, causing the actual cost to be higher than the target cost—15 cents of every dollar over the chosen target cost is deducted from the target fee. Since share ratio risk is shifted between the contractor and the Government, the minimum share ratio should consider the maximum amount of risk the Government is willing to accept on this particular contract given current market conditions. For example, if the Government is willing to bear a maximum of 85% of the risk, the minimum contractor risk should be set at 15%. Another point to consider, as the contractor's share ratio approaches zero, the contract mimics a cost plus fixed fee (CPFF) arrangement. Figure 17 shows how a maximum share ratio of 15% (highlighted in red) populates the share ratio column as well as alters the target fee column of the contract menu. After the minimum share ratio is entered, the target fee column will adjust to the minimum share ratio.

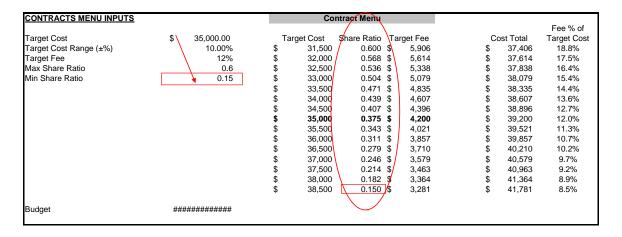| CONTRACTS MENU INPUTS		Contract Menu				
		Target Cost	Share Ratio	Target Fee	Cost Total	Fee % of Target Cost
Target Cost	$ 35,000.00	$ 31,500	0.600	$ 5,906	$ 37,406	18.8%
Target Cost Range (±%)	10.00%	$ 32,000	0.568	$ 5,614	$ 37,614	17.5%
Target Fee	12%	$ 32,500	0.536	$ 5,338	$ 37,838	16.4%
Max Share Ratio	0.6	$ 33,000	0.504	$ 5,079	$ 38,079	15.4%
Min Share Ratio	0.15	$ 33,500	0.471	$ 4,835	$ 38,335	14.4%
		$ 34,000	0.439	$ 4,607	$ 38,607	13.6%
		$ 34,500	0.407	$ 4,396	$ 38,896	12.7%
		$ 35,000	**0.375**	**$ 4,200**	**$ 39,200**	**12.0%**
		$ 35,500	0.343	$ 4,021	$ 39,521	11.3%
		$ 36,000	0.311	$ 3,857	$ 39,857	10.7%
		$ 36,500	0.279	$ 3,710	$ 40,210	10.2%
		$ 37,000	0.246	$ 3,579	$ 40,579	9.7%
		$ 37,500	0.214	$ 3,463	$ 40,963	9.2%
		$ 38,000	0.182	$ 3,364	$ 41,364	8.9%
		$ 38,500	0.150	$ 3,281	$ 41,781	8.5%
Budget	#############					

Figure 17.   Minimum Share Ratio Input

6.   Budget

The final input into the TRIM is budget. The budget is the dollar amount, authorized by Congress, to be expended on this particular procurement. The budget should include both cost and fee. Before entering the budget, please refer to Figure 18. In Figure 18, the budget cell is located in the bottom left corner, highlighted in red. Currently there is a large placeholder value in the budget cell. The large placeholder ensures the contract menu is not constrained by the budget.

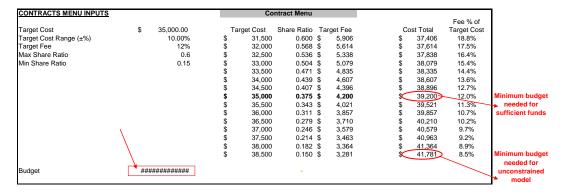| CONTRACTS MENU INPUTS		Contract Menu					
		Target Cost	Share Ratio	Target Fee	Cost Total	Fee % of Target Cost	
Target Cost	$ 35,000.00	$ 31,500	0.600	$ 5,906	$ 37,406	18.8%	
Target Cost Range (±%)	10.00%	$ 32,000	0.568	$ 5,614	$ 37,614	17.5%	
Target Fee	12%	$ 32,500	0.536	$ 5,338	$ 37,838	16.4%	
Max Share Ratio	0.6	$ 33,000	0.504	$ 5,079	$ 38,079	15.4%	
Min Share Ratio	0.15	$ 33,500	0.471	$ 4,835	$ 38,335	14.4%	
		$ 34,000	0.439	$ 4,607	$ 38,607	13.6%	
		$ 34,500	0.407	$ 4,396	$ 38,896	12.7%	
		$ 35,000	**0.375**	**$ 4,200**	$ 39,200	12.0%	**Minimum budget needed for sufficient funds**
		$ 35,500	0.343	$ 4,021	$ 39,521	11.3%	
		$ 36,000	0.311	$ 3,857	$ 39,857	10.7%	
		$ 36,500	0.279	$ 3,710	$ 40,210	10.2%	
		$ 37,000	0.246	$ 3,579	$ 40,579	9.7%	
		$ 37,500	0.214	$ 3,463	$ 40,963	9.2%	
		$ 38,000	0.182	$ 3,364	$ 41,364	8.9%	
		$ 38,500	0.150	$ 3,281	$ 41,781	8.5%	**Minimum budget needed for unconstrained model**
Budget	#############	-					

Figure 18.   Budget Input and Budget Constraints.

There are also two important budget numbers in Figure 18, circled in red, in the cost total column. The dollar values in the cost total column are the sum of the target cost and target fee in that particular row. The first important budget number ($39200) represents the minimum budget required for the contract to have sufficient funds. This dollar value is based on the most likely target cost estimate ($35,000) and the target fee established using a structured approach ($4,200). If the appropriated funding is less than this value, there is not enough money to award a contract. If a budget value less than this number is entered, the TRIM mechanism will not work, and an "insufficient funds" warning in cell F25 will result.

The second number circled in the cost total column in Figure 18 ($41,781) represents the minimum budget needed for the TRIM to operate without constraints. This number ($41,781) represents the budget needed to fully fund the contract to cover both the target cost at the highest point on the total cost range ($38,500), and the associated target fee ($3,281). Any dollar value less than this number will constrain the TRIM's ability to offer a contract option at the highest point on the total cost range (+10). If the budget is low enough to constrain the TRIM, a "budget constrained" warning in cell F24 will result. Under a constrained budget, the upper bound of the target cost range is adjusted to the constrained budget and does not include the full target cost range that would be included without the budget constraint. While the effectiveness of the TRIM is not reduced, the Government budget boundaries clearly limit the contract option choices available to the contractor and weaken the incentives for truth revelation. The option desired by the contractor whose expected costs exceed the target cost may not be available if budget constrained. The notification of "Budget Constrained" reveals a restricted Government position in offering contract options with a higher target if their expected costs exceed the total budget. Simply put, the Government's financial boundaries are binding when a Budget Constrained situation occurs.

C.   UNDERSTANDING THE FEE PAYOUT TABLE: HOW THE TRIM INCENTIVIZES CONTRACTORS TO REVEAL THEIR TRUE COSTS

1.   Offering the Contract Menu to Contractors

Once all inputs are entered into the TRIM, the contracts menu is ready for use in negotiations with the contractor. Figure 19 is a snap shot of what the contract menu would look like given the input values in the previous section.

Option	Target Cost	Share Ratio	Target Fee
Contract Menu			
1	$ 31,500	0.600	$ 5,906
2	$ 32,000	0.568	$ 5,614
3	$ 32,500	0.536	$ 5,338
4	$ 33,000	0.504	$ 5,079
5	$ 33,500	0.471	$ 4,835
6	$ 34,000	0.439	$ 4,607
7	$ 34,500	0.407	$ 4,396
8	**$ 35,000**	**0.375**	**$ 4,200**
9	$ 35,500	0.343	$ 4,021
10	$ 36,000	0.311	$ 3,857
11	$ 36,500	0.279	$ 3,710
12	$ 37,000	0.246	$ 3,579
13	$ 37,500	0.214	$ 3,463
14	$ 38,000	0.182	$ 3,364
15	$ 38,500	0.150	$ 3,281

Figure 19.   TRIM-based Contract Menu #2

There are several ways in which the contract menu can be used in negotiations with the contractor. The easiest way to negotiate a contract price is to hand the contracts menu over and let the contractor choose a contract option.

If uncomfortable with this unorthodox style of negotiation, choose not to show the contractor the contract menu. Instead, start negotiations by proposing the target cost option on the menu. If the contractor is satisfied with the target cost option, try to incentivize them by offering a larger target fee if they can lower their target cost. For example, if the contractor proposes a target cost of $36,00, based on the contract menu in Figure X, offer contractor option # 10 ($36000, .311, $3857). If the contractor agrees to

this price, continue to offer higher fee for a lower target cost (options #9, #8, #7, etc.) until the contractor no longer lowers their target cost.

On the other hand, if the contractor rejects the original offer, propose another contract option more aligned with their desires. For example, if the contractor proposes a target cost of $35000, based on the contract menu above in Figure X, respond with option #8 ($35,000, .375, $42,00). If the contractor is unsatisfied with the counter offer because they want a larger target fee ($4,600 is ideal for the contractor), then offer the contractor option #6 from the contract menu.

The negotiation should continue until the contract option that best aligns the Government's desires (lower cost) with the contractors desires (higher fee) is found. Once again, it is important to remember that the contractor must choose across a row (i.e., they cannot choose the target cost from option #8, a share ratio from option #10, and a target fee from option #4. The contract menu is only truth revealing when the contractor chooses options as they are listed, across the row.

2.   The Fee Payout Table

The fee payout table is a tool to help understand why the TRIM is truth revealing. The fee payout table can be found on the second worksheet in the TRIM excel file, labeled "Fee Payout Table." Figure 20 is a snapshot of the fee payout table based on the example developed throughout the user's guide.

	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
									Actual Cost							
4	Target Cost	$ 31,500	$ 32,000	$ 32,500	$ 33,000	$ 33,500	$ 34,000	$ 34,500	$ 35,000	$ 35,500	$ 36,000	$ 36,500	$ 37,000	$ 37,500	$ 38,000	$ 38,500
5	$ 31,500	$ 5,906	$ 5,606	$ 5,306	$ 5,006	$ 4,706	$ 4,406	$ 4,106	$ 3,806	$ 3,506	$ 3,206	$ 2,906	$ 2,606	$ 2,306	$ 2,006	$ 1,706
6	$ 32,000	$ 5,898	$ 5,614	$ 5,330	$ 5,046	$ 4,763	$ 4,479	$ 4,195	$ 3,911	$ 3,627	$ 3,343	$ 3,059	$ 2,775	$ 2,491	$ 2,207	$ 1,923
7	$ 32,500	$ 5,874	$ 5,606	$ 5,338	$ 5,071	$ 4,803	$ 4,535	$ 4,267	$ 3,999	$ 3,731	$ 3,463	$ 3,196	$ 2,928	$ 2,660	$ 2,392	$ 2,124
8	$ 33,000	$ 5,834	$ 5,582	$ 5,330	$ 5,079	$ 4,827	$ 4,575	$ 4,323	$ 4,071	$ 3,820	$ 3,568	$ 3,316	$ 3,064	$ 2,813	$ 2,561	$ 2,309
9	$ 33,500	$ 5,778	$ 5,542	$ 5,306	$ 5,071	$ 4,835	$ 4,599	$ 4,363	$ 4,128	$ 3,892	$ 3,656	$ 3,421	$ 3,185	$ 2,949	$ 2,713	$ 2,478
10	$ 34,000	$ 5,705	$ 5,486	$ 5,266	$ 5,046	$ 4,827	$ 4,607	$ 4,388	$ 4,168	$ 3,948	$ 3,729	$ 3,509	$ 3,289	$ 3,070	$ 2,850	$ 2,630
11	$ 34,500	$ 5,617	$ 5,413	$ 5,210	$ 5,006	$ 4,803	$ 4,599	$ 4,396	$ 4,192	$ 3,988	$ 3,785	$ 3,581	$ 3,378	$ 3,174	$ 2,971	$ 2,767
12	$ 35,000	$ 5,513	$ 5,325	$ 5,138	$ 4,950	$ 4,763	$ 4,575	$ 4,388	$ 4,200	$ 4,013	$ 3,825	$ 3,638	$ 3,450	$ 3,263	$ 3,075	$ 2,888
13	$ 35,500	$ 5,392	$ 5,221	$ 5,049	$ 4,878	$ 4,706	$ 4,535	$ 4,363	$ 4,192	$ 4,021	$ 3,849	$ 3,678	$ 3,506	$ 3,335	$ 3,163	$ 2,992
14	$ 36,000	$ 5,255	$ 5,100	$ 4,945	$ 4,789	$ 4,634	$ 4,479	$ 4,323	$ 4,168	$ 4,013	$ 3,857	$ 3,702	$ 3,546	$ 3,391	$ 3,236	$ 3,080
15	$ 36,500	$ 5,103	$ 4,963	$ 4,824	$ 4,685	$ 4,546	$ 4,406	$ 4,267	$ 4,128	$ 3,988	$ 3,849	$ 3,710	$ 3,571	$ 3,431	$ 3,292	$ 3,153
16	$ 37,000	$ 4,934	$ 4,811	$ 4,688	$ 4,564	$ 4,441	$ 4,318	$ 4,195	$ 4,071	$ 3,948	$ 3,825	$ 3,702	$ 3,579	$ 3,455	$ 3,332	$ 3,209
17	$ 37,500	$ 4,749	$ 4,642	$ 4,535	$ 4,428	$ 4,321	$ 4,213	$ 4,106	$ 3,999	$ 3,892	$ 3,785	$ 3,678	$ 3,571	$ 3,463	$ 3,356	$ 3,249
18	$ 38,000	$ 4,548	$ 4,457	$ 4,366	$ 4,275	$ 4,184	$ 4,093	$ 4,002	$ 3,911	$ 3,820	$ 3,729	$ 3,638	$ 3,546	$ 3,455	$ 3,364	$ 3,273
19	$ 38,500	$ 4,331	$ 4,256	$ 4,181	$ 4,106	$ 4,031	$ 3,956	$ 3,881	$ 3,806	$ 3,731	$ 3,656	$ 3,581	$ 3,506	$ 3,431	$ 3,356	$ 3,281

Figure 20.   TRIM-based Fee Payout Table

In Figure 20, the letters (D-S) represent the columns and the numbers (4-19) represent the rows. The letters and numbers will be used to identify specific cells in explaining this payout table. The cells colored in blue represent the target cost options available on the contract menu. The cells colored green represent the actual cost of the contract. The cells in yellow and orange represent the potential fee available to the contractor. The cells in orange highlight the highest potential fee a contractor can receive for a given actual cost.

The target fee function is structured such that contractors have the potential to receive a higher fee if they choose a lower target cost. This incentivizes the contractor to choose the lowest target cost possible, so long as their estimated actual costs are equal to or near the target cost. However, if the contractor knows their estimated costs are lower than the target cost, the share ratios are structured so that contractors receive a lower fee by overstating the target cost and under-running the target than they would by simply accepting a lower cost target. At the same time, the share ratio incentivizes the contractor to save costs wherever possible, once the target cost has been selected, to generate a larger fee from an under-run. The mathematical relationship between the target fees, target costs, and share ratio ensure the additional fee gained from the under-run share ratio are lower than the increase in target fee from selecting a lower target cost. Reciprocally, the fee lost from sharing the cost of over-running the target are always more than the increased target fee from selecting a lower target cost.

If a contractor can estimate with certainty that their true costs will be $34,000 (column J). The contractor earns the highest fee if they choose a target cost of $34,000 (cell J10). Cell J10 is highlighted in orange on the pay-out table because it is the highest fee the contractor can receive for an actual cost of $34,000. If the contractor estimates that their true costs will be $34,000 but decides to choose a different target cost—the fee is not optimal. For example, a contractor with expected costs of $34,000 acts strategically by choosing a higher target cost (e.g., $36,000) so they can earn additional fees from an under-run. The fee received in this scenario ($ 4,479, Cell J14) is less than fee received if the contractor revealed their true cost ($4,607, Cell J10). On the other hand, if the contractor with expected costs of $34,000 acts strategically by choosing a

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lower target cost (e.g., $32,000) because the target fee is larger ($5,614), the over-run share ratio will deplete the target fee so it is less ($4,479, Cell J6) than the fee received if the contractor revealed their true cost ($4,607, Cell J10).

D.   HOW TO ADMINISTER FEE ON A CPAF/IF CONTRACT THAT USES THE TRIM

Before using the TRIM to administer fees during contract execution, it is important to understand the types of contracts that fit within the TRIM parameters. The TRIM is designed for cost reimbursement contracts. Specifically, the TRIM is intended for Cost-plus-award-fee/Cost-plus-incentive-fee (CPAF/IF) contracts. The following section explains how to use the TRIM contract menu and payout table to calculate the fee awarded to the contractor during CPAF/IF contract performance.

1.   Determining the Target Fee

The contractor selects their own target fee when they choose a contract option from the contract menu. Once the contractor has chosen their target fee, it is time to use the TRIM to divide the target fee between an incentive fee and an award fee.

2.   Deriving the Award Fee and Incentive Fee from the Target Fee

Once the contractor has chosen their target fee, the Government must determine how much target fee to assign as incentive fee and how much to assign as award fee. The incentive fee is an objective formula that incentivizes the contractor to control costs. The award fee is a subjective incentive that a contractor may earn in entirety or in part during contract performance. The award fee portion of the target fee incentivizes the contractor for performance areas outside of cost including quality, schedule, and technical performance.

It is the contracting officer's job, in conjunction with the Government integrated product team (IPT) and stakeholders of the product/service being acquired, to determine how much of the target fee should be dedicated to controlling costs and how much should be dedicated to controlling areas other than cost. Once the contracting officer knows

these percentages, the contracting officer should enter this information into the TRIM to determine the value of the incentive fee and award fee. Figure 21 is a snapshot of both the TRIM contract menu and the administrative function that determines the incentive and award fee pools. In this particular example, the contractor selected the contract menu option with a target fee of $4,607, circled in red, in the target fee column of the contracts menu. The Government IPT believe cost control is important enough to warrant 40% of the overall target fee, so the contracting officer enters 40% into the incentive fee input cell and 60% into the award fee input cell. The input cells are highlighted in red on the left hand side of Figure 21. After incentive and award fee percentages are entered into the TRIM, it automatically determines the dollar values of both the incentive and award fee pools. In this example, the potential incentive fee pool ($1,843) and the potential award fee pools ($2,764) are circled in red at the bottom of Figure 21.
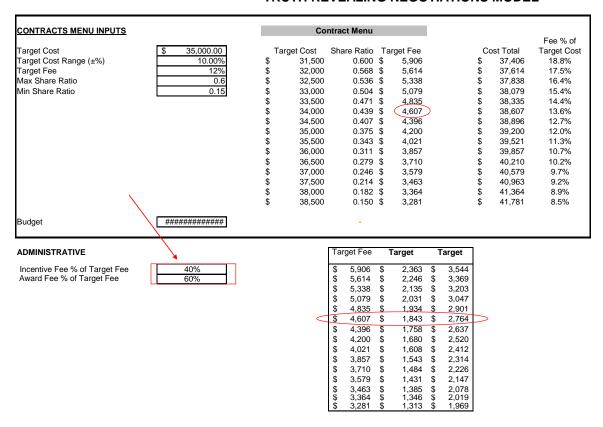
TRUTH REVEALING NEGOTIATIONS MODEL

CONTRACTS MENU INPUTS

Target Cost	$	35,000.00
Target Cost Range (±%)		10.00%
Target Fee		12%
Max Share Ratio		0.6
Min Share Ratio		0.15

					Contract Menu						
											Fee % of
	Target Cost		Share Ratio		Target Fee			Cost Total			Target Cost
$	31,500		0.600	$	5,906		$	37,406			18.8%
$	32,000		0.568	$	5,614		$	37,614			17.5%
$	32,500		0.536	$	5,338		$	37,838			16.4%
$	33,000		0.504	$	5,079		$	38,079			15.4%
$	33,500		0.471	$	4,835		$	38,335			14.4%
$	34,000		0.439	$	4,607		$	38,607			13.6%
$	34,500		0.407	$	4,396		$	38,896			12.7%
$	35,000		0.375	$	4,200		$	39,200			12.0%
$	35,500		0.343	$	4,021		$	39,521			11.3%
$	36,000		0.311	$	3,857		$	39,857			10.7%
$	36,500		0.279	$	3,710		$	40,210			10.2%
$	37,000		0.246	$	3,579		$	40,579			9.7%
$	37,500		0.214	$	3,463		$	40,963			9.2%
$	38,000		0.182	$	3,364		$	41,364			8.9%
$	38,500		0.150	$	3,281		$	41,781			8.5%

Budget	$	############

ADMINISTRATIVE

Incentive Fee % of Target Fee	40%
Award Fee % of Target Fee	60%

Target Fee		Target		Target
$ 5,906	$	2,363	$	3,544
$ 5,614	$	2,246	$	3,369
$ 5,338	$	2,135	$	3,203
$ 5,079	$	2,031	$	3,047
$ 4,835	$	1,934	$	2,901
$ 4,607	$	1,843	$	2,764
$ 4,396	$	1,758	$	2,637
$ 4,200	$	1,680	$	2,520
$ 4,021	$	1,608	$	2,412
$ 3,857	$	1,543	$	2,314
$ 3,710	$	1,484	$	2,226
$ 3,579	$	1,431	$	2,147
$ 3,463	$	1,385	$	2,078
$ 3,364	$	1,346	$	2,019
$ 3,281	$	1,313	$	1,969

Figure 21.   TRIM-based Administrative Function

3.   Administering the Incentive Fee

After dividing the overall contract target fee into an incentive fee pool and an award fee pool—they must be kept separate. The incentive fee pool and the award fee pool will be distributed at different times, in different manners.

The incentive fee is based on how well the contractor's target cost matches the contract's actual costs. If the contract's actual cost is the same as the target cost, the contractor will receive the entire incentive fee. Using Figure 21 as an example, the contractor would receive the entire $1843 if the target cost and the actual cost were both $34,000. If the actual cost ended up lower than the target cost, the contractor would

receive the entire incentive pool plus a portion of every dollar that the actual cost was lower than the target cost. The equation that represents the Incentive fee function is:

$$F = I + S \ (T\text{-}A)$$

Where:

F = Actual incentive fee earned by the contractor

I = Target Incentive Fee

S = Share ratio

T = Target cost

A = Actual cost

Using Figure 21 as an example, if the actual contract cost is $33,000 and the contractor's target cost was $34,000, the contractor would earn the entire target incentive fee ($1,843) plus their share (.439) of the $1000 under-run ($1,000 x .439 = $439). This gives the contractor an actual incentive fee of $2,282.

If the actual cost is greater than the target cost, the contractor's actual incentive fee would be the target incentive fee minus the contractor's share of the overrun (if A > T in the formula above, T – A < 0). Using Figure 21 as an example, if the actual contract cost was $36,000 and the contractor's target cost was $34,000—the contractor would earn the target incentive fee ($1,843) minus their share of the overrun ($2,000 x .439 = $878). In this case, the contractor would earn an actual incentive fee of $965 ($1,843 - $878 = $965).

The problem with incentive fees is that you cannot determine actual costs until the end of the contract when the product/service has been delivered and the contract has been closed. Waiting until contract closeout can be too long a wait for a contractor to receive fees. Therefore, incentive fee payments should be made throughout the duration of the contract, based on estimations of how the contractor is controlling costs. For example, the contractor should submit cost vouchers to recoup their actual costs of labor, materials, etc., throughout the duration of the cost-reimbursement contract. The contracting officer should award incentive fees based on the percentage of costs. For example, if the

contractor submits a cost voucher for 10% of the contract value, then 10% of the target incentive fee should be up for consideration. The contracting officer should use earned value management data, specifically the cost performance index, to determine the portion of the accrued target incentive fee to award the contractor. For example, a contractor has selected a contract from the TRIM contract menu with a target cost of $34,000, a share ratio of .439, and a target fee of $4,607. Of that target fee, $1,843 is dedicated to the target incentive fee pool. If the contractor submits a cost reimbursement voucher for 10% of the contract value ($3,400), then 10% of the award fee pool should be considered for determination ($184). If the current earned value management data states that the actual costs are aligned with the budgeted costs (the cost performance index is 1.00), then the contracting officer should award the full 10% of the target incentive fee pool ($184).

Remember, these interim incentive fee payments awarded to the contractor are only estimates. Once the contract is closed out and actual costs can be determined, the incentive fee awarded should be adjusted accordingly. If the contractor's incentive fee payments exceed what they have actually earned, the contractor will need to return the overpayment to the Government.

4. Administering the Award Fee

The award fee is a subjective incentive that a contractor may earn in its entirety or in part during contract performance. The award fee portion of the overall target fee is intended to incentivize the contractor for performance areas outside of cost such as quality, schedule, and technical performance. The contracting officer should work with all acquisition stakeholders to determine which areas of contractor performance, outside of cost control, need incentivizing.

The step by step instructions on how to set-up an award fee plan is highly involved and outside the scope of this users guide. Refer to your Government agencies' instructions on award fee to determine how to properly set-up the award fee portion of the overall target fee. If your agency does not have an award fee guide, our suggested

reference is the Department of the Air Force Award Fee Guide located in the AT&L Knowledge Sharing System of the Defense Acquisition University website[25].

5.   The Crucial Relationship between the Incentive and Award Fees When Using the TRIM

For the TRIM to create truth revealing incentives, the incentive fee pool and the award fee pool must be tied together. The contractor's share of a cost over-run can eat away both the cost incentive and award fee pool. The TRIM mechanism is based on the total target fee and the contractor sharing ratio. Even though we have divided the total fee into a cost incentive pool and an award fee pool to incentivized areas other than cost, the contractor share ratio is tied to the total target fee; if the cost over-run is large enough, it depletes both pools.

The contract should be structured so any cost over-run is subtracted from the incentive fee portion of the total fee first. If the cost over-run is so large that it eliminates the entire cost incentive fee, then the cost-overrun must be subtracted from the award fee pool. On the other hand, if the contractor is under-running the contract, all additional fees are awarded as part of the incentive fee pool, not the award fee pool. Adding the contractor under-run fees to the award fee pool would be unfair because the contractor would have to earn the cost savings fee twice.

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